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THE COVID-19 TRIAD, INFLAMMATORY CASCADE AND DIABETES: IMPLICATIONS FOR NURSING CARE

A TRÍADE COVID-19, CASCATA INFLAMATÓRIA E DIABETES: IMPLICAÇÕES PARA O CUIDADO DE ENFERMAGEM

LA TRIADA COVID-19, CASCADA INFLAMATORIA Y DIABETES: IMPLICACIONES PARA LA ATENCIÓN DE ENFERMERÍA

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ABSTRACT

Objective: to reflect on the relationship between diabetes, inflammatory cascade and COVID-19 and nursing care strategies for diabetic patients to reduce the risk of COVID-19 and its complications. **Method**: theoretical and reflective study developed according to the steps of the Arch Method between May and July 2020 by participants of a support group for diabetic people, an educational institution in southern Brazil. **Results**: the metabolic cascade involved in hyperglycemia and insulin resistance are directly related to the inflammatory cascade and greater propensity to infections and unfavorable outcomes in the face of COVID-19 in diabetics and nursing and health care require the use of new technologies to maintenance of proper health care, virtual technologies stand out. **Conclusion**: It reaffirms the importance of controlling diabetes, which in the scenario of social isolation finds support in the care of health professionals and the use of technology.

Descriptors: Diabetes mellitus; Communicable diseases; Coronavirus infections; Nursing; Delivery of Health Care.

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RESUMO

Objetivo: refletir sobre a relação entre diabetes, cascata inflamatória e COVID-19 e estratégias de cuidados de enfermagem aos pacientes diabéticos para a redução dos riscos de COVID-19 e suas complicações. **Método:** estudo teórico e reflexivo desenvolvido segundo as etapas do Método do Arco entre maio e julho de 2020 por participantes de grupo de apoio às pessoas diabéticas instituição de ensino do sul do Brasil. **Resultados:** a cascata metabólica envolvida na hiperglicemia e a resistência à insulina estão diretamente relacionadas à cascata inflamatória e à maior propensão a infecções e desfechos desfavoráveis diante da COVID-19 em diabéticos e o cuidado de enfermagem e de saúde exigem o uso de novas tecnologias para manutenção da devida atenção à saúde, destaca-se as tecnologias virtuais. **Conclusão:** Reafirma-se a importância do controle do diabetes, que no cenário do isolamento social encontra apoio na atenção dos profissionais da saúde e uso da tecnologia.

Descritores: Diabetes mellitus; Doenças transmissíveis; Infecções por coronavírus; Enfermagem; Atenção à saúde.

RESUMEN

Objetivo: reflexionar sobre la relación entre diabetes, cascada inflamatoria y COVID-19 y las estrategias de atención de enfermería al diabético para reducir el riesgo de COVID-19 y sus complicaciones. **Método**: estudio teórico y reflexivo desarrollado según los pasos del Método Arco entre mayo y julio de 2020 por participantes de un grupo de apoyo a personas diabéticas, en una institución educativa de Brasil. **Resultados**: la cascada metabólica involucrada en la hiperglucemia y la resistencia a la insulina está relacionada con la cascada inflamatoria y una mayor propensión a infecciones y desenlaces desfavorables frente al COVID-19 y la enfermería y la atención de la salud requieren el uso de nuevas tecnologías para el mantenimiento de el cuidado. **Conclusión**: Se reafirma la importancia del control de la diabetes, que en el escenario de aislamiento social encuentra apoyo en la atención de los profesionales de la salud y el uso de la tecnología.

Descriptores: Diabetes mellitus; Enfermedades Transmisibles; Infecciones por coronavirus; Enfermería; Atención a la Salud.

INTRODUCTION

Diabetes mellitus (DM) is a chronic condition associated with both micro- and macrovascular complications, with high rates of morbidity and mortality worldwide.[1]

The current health scenario impacted by the pandemic of the new coronavirus (SARS -CoV-2) highlighted the DM putting it in focus in several debates, research and investigations as a comorbidity often associated with the worsening of infectious conditions. Study points out that comorbidities such as DM, Systemic Arterial Hypertension (SAH) and coronary disease contribute to a higher risk of worse outcomes from COVID-19.[2]

Although scientific knowledge is urgent and has advanced, especially as a result of the COVID-19, there are still many discussions and doubts about the exact inflammatory and immune response caused by the infection by the new coronavirus in the practice of care for people with DM. It is fundamental for the care to know the specific and inflammatory changes resulting from diabetes in association with the infectious state caused by the action of the SARS-CoV-2 virus. In a context of urgency such as that caused by the pandemic, science is running out of time to act in the treatment of the disease and the specific demands, as in the case of the triad COVID-19, inflammatory cascade and DM.

In this perspective, the members of the university extension action Agir e Educar (em)frente o Diabetes Mellitus (Acting and Educating (in)face of Diabetes Mellitus), from the Federal University of Santa Catarina, who have been dedicated for five years to the study and health care of people with diabetes, especially in the context of health education, in view of the pandemic state, highlight the need to focus their planning and actions on this demand as well.

This way, this paper aimsto reflect on the relationship between diabetes, the inflammatory cascade and COVID-19 and nursing care strategies for diabetic patients to reduce the risks of COVID-19 and its complications.

METHOD

Type of study

Theoretical and reflective study developed according to the Arch Method[3] and the checklist for qualitative studies.[4]

Study participants and location

The authors of this study were the participants of this practice: three teaching nurses participating in the Group Acting and Educating (in)face of Diabetes Mellitus and a doctoral student of a nursing postgraduate program in the professional modality, who develops her academic studies in the area of DM with a link to the mentioned support group.

Theoretical-methodological framework

The Arc Method[3] allows subjects involved in a given reality and scenario to observe the phenomenon, problematize the practice for the resolution of problems and/or transformation of practice. It suggests steps that include observing reality, defining the key points that need reflection and theorizing, and defining hypotheses for solutions that must be applied to reality.[4]

The steps applied in this study are presented below. It is also noted that, considering the nature of the investigation, there was no need for an ethical assessment of this study in accordance with current resolution 0510/2016, which includes cases in which there is a waiver of the need for approval by the ethics committee.

Observation of reality

The extension action "Agir e Educar (em) frente o Diabetes *mellitus" (*Acting and Educating (in)face of Diabetes mellitus) has the participation of nurses/nursing professors, nutritionists and nursing students for health education to people with DM. Among the various strategies developed by the Acting, the health education group, with the same name, stands out, with periodic face-to-face meetings, representing spaces for care.

Since the beginning of the group's meetings, five years ago, understanding the chronic condition of diabetes, adherence to treatment and the quality of life of diabetics in the face of the numerous difficulties imposed by DM, have always been important aspects for those responsible for the Action.

The experiences with the aforementioned extension action, the COVID-19 pandemic, the possible relationship between the pathophysiological responses related to the inflammatory cascade, as well as DM as a comorbidity strongly associated with complications and increased mortality due to the infection of the new coronavirus represent the reality from which the problem addressed in this study emerges.

This Arch stage was held in a virtual meeting (first remote meeting), via web

conference, between the authors, in May 2020, lasting approximately two hours to outline the questions that contextualize the problem of this study.

Definition of key-points

Still on the first remote date the key points for the theorization stage were defined (two hours of work), when three key points were agreed among the participants to be studied and discussed: the relationship between diabetes, the inflammatory cascade and COVID-19; implication for the treatment of infection by the novel coronavirus in people with diabetes; nursing care for people with diabetes to reduce the risk of COVID-19. Yet at this stage, it was defined that the theorization of key points should take place from official documents of public bodies such as World Health Organization, as well as documents produced by specific associations that study DM, including the American Diabetes Association (ADA), the International Diabetes Federation, in addition to updated national and international scientific articles (last three years). It was agreed that all the authors would carry out the searches and theorization of all the key points and, later, in a new remote meeting, the findings would be presented, discussed and reached a consensus.

Theorizing

At theorizing stage, the searches for theoretical knowledge included 20 hours of study by each participant and the discussion of the findings in a remote meeting with an additional four hours of work, held in June 2020. The consensus of the discussion on the findings to compose this theoretical study were recorded in file storage and synchronization service and reviewed by all authors in between the third and fourth remote meeting.

Definition of solution hypotheses

It corresponded to the fourth remote meeting, which took place in June 2020. For the development at this stage, the theoretical survey defined as the corpus of theorization supported the reflection and definition of nursing care needs for people with DM to reduce the risks of COVID-19 and possible nursing care to be implemented in the form of health education with the group participants “Agir e Educar (em) frente o Diabetes *mellitus” (*Acting and Educating (in)face of Diabetes Mellitus) for the prevention of COVID-19.

Application to reality

This stage of the Arch was started, but it was not completed, since there was no time to fully implement the nursing care resulting from the reflection. As it is an extension of continuity action, there is an

interest and commitment to fully apply the proposed strategies and evaluate the results.

RESULTS

Theorizing

Exposure of people to the new coronavirus can cause respiratory disease with worsening of the condition, especially in those with cardiovascular diseases, diabetes, chronic respiratory diseases and cancer.[5]

Regardless of the associated pathology, what is common in affected cases is immune dysfunction, which is a characteristic in cases of COVID-19 and may be related to the severity and mortality of the disease. Systemic immunocompromise in patients with any of the diseases classified as a "risk group", including DM, has been presenting worse results than the rest of the critically ill population.[6,7]

As a starting point, it is inferred that the metabolic cascade involved in the occurrence of hyperglycemia and insulin resistance is directly related to the increase in the synthesis of end products of glycosylation, pro-inflammatory cytokines, occurrence of oxidative stress, in addition to stimulating the production of adhesion molecules that mediate tissue inflammation. This sequence of occurrences ends up leading to unfavorable outcomes.[8]

Pathogenic human coronaviruses have the ability to bind to target cells through the angiotensin-converting enzyme 2 (ACE2), expressed by epithelial cells of the lung, intestine, kidney and blood vessels. It is known, however, that ACE2 is substantially increased in patients with type 1 or 2 diabetes treated with ACE inhibitors and angiotensin II receptor blockers.[8]

Faced with these findings, some questions have arisen about the appropriate treatment for diabetics. With regard to pharmacological treatment, there is no conclusive evidence to support discontinuation of angiotensin converting enzyme (ACE) inhibitors, angiotensin receptor blockers, or thiazolidinediones due to COVID-19 in people with diabetes. Although there are some disagreements regarding these issues, some authors raise the possibility that drugs used to treat diabetes and hypertension may be related to mechanisms that contribute to the severity and worsening of the SARS-Cov-2 infection.

Chronic hyperglycemia, a frequent complication in people with diabetes, considerably affects several target organs that are essential in the homeostatic maintenance of the body, highlighting alveolar gas exchange, which is also compromised by COVID-19. In addition, hyperglycemia culminates in a lower capacity of erythrocytes, impacting the very dissemination of oxygen to tissues, a process

secondary to hemoglobin glycation, in addition to compromising the innate immune response and also adaptive cellular immunity, crucial in fighting infections, including COVID-19 itself.[9]

Among the implications that contribute to a better outcome regarding the conduct of people with diabetes are: glycemic control has been shown to be essential to help reduce the risk of infection and severity of the disease; more frequent monitoring of blood glucose levels, reducing the chances of secondary bacterial pneumonia, among other possible complications; control and adequacy of mineral and vitamin deficiencies and adherence to the immunization scheme, especially with regard to vaccines against influenza and pneumonia. The latter may decrease the chances of secondary bacterial pneumonia after a respiratory viral infection.[10]

Another widespread aspect is the relationship attributed to vitamin D and physical exercise in terms of optimizing immunity. Specifically about vitamin D, or also known as cholecalciferol, this has the appearance of pleiotropy, being a fundamental matrix in the issue of immunity, since it is related to both the innate and adaptive immune systems. Among the various functions of cholecalciferol, it stimulates the production of macrophages, which are the body's first line of defense cells. The ideal doses for each individual is still controversial, but there is unanimity that avoiding severe vitamin D deficiency improves immune health and decreases susceptibility to autoimmune diseases.[11]

With regard to physical activity in controlling diabetes and in view of the need for social isolation, an Italian, retrospective study carried out with adolescents with DM 1 in social isolation due to the COVID-19 pandemic showed good glycemic control in those who maintained physical activity, regulation blood glucose, along with insulin and diet.[12]

Physical activities adopted in social isolation included several safe, simple and easily implemented exercises, such as body weight exercises, jumping rope and online classes. Especially in the current situation of total or partial social isolation, regular exercise is essential not only for glycemic control, but also for psychological well-being, since physical activity reduces stress and anxiety and even improves mood and sleep quality.[12]

In this context, nursing care for people with DM to reduce the risks of COVID-19 should encompass actions that involve not only prevention but also health promotion aspects, taking into account that aspects such as the socioeconomic and educational conditions of the population are factors hindering the successful implementation of these measures.[13]

The use of specific nursing educational technologies is considered an excellent strategy, conributing greatly to expanding the knowledge of people with DM and serving as support in the care provided by nurses, such as manuals and booklets. [14' 15]

Among the precautions to be adopted, nursing assumes an important role in health education, minimizing events that may aggravate the health condition, including possible hyper or hypoglycemic events, which includes guidelines for following the care routine, even sometimes requiring adaptations because of social isolation.[16]

REFLECTION

People with diabetes alone, in general, show significant difficulty in adhering to the treatment of the disease. Social isolation can contribute to discontinuity in food control, considering that it has forced families to stay in their homes and it has been quite common to make different recipes, including high-calorie ones, to occupy time and family members, in addition to increasing the number of daily meals.

With regard to drug control, social isolation can contribute to the non-suitability of the therapeutic plan to current health conditions, as many patients remain without proper health monitoring, as a result of people's fears and anxieties in going to the health units in search of care, because they are exposed to the risk of infection by the new coronavirus and, also, due to the limits of care imposed by health units.

Another important aspect in controlling diabetes is carrying out regular physical activities hampered by the COVID-19 pandemic, when gyms were closed and even after opening, through distancing measures; there is a fear of contamination by the new coronavirus, added to the fact that a significant number of people with diabetes no longer have the disciplined habit of maintaining physical activity.

It is reflected that health education in this context is an important tool for controlling diabetes and reducing the distance between the patient and health professionals. However, it requires creativity, new initiatives and improvement of professionals, recreating care. On the other hand, recreating suggests that the new actions will not only be applied during the period of the COVID-19 pandemic, but will remain permanently.

Thus, considering theorization and reflection added to the experience of the participants in this study, hypotheses for solutions were elaborated, which configure the actions in health and nursing care that can be implemented in the care of people with diabetes and in the Act and Educate group (in)face of Diabetes mellitus (Chart 1).

Table 1 -Solution hypotheses

Activities proposed for application to reality
Telemedicine, nursing and nutrition teleconsultation.
Maintenance or adaptation of the treatment prescribed by telemedicine or by face-to-face consultation.
Virtual guidelines for doubts in the face of COVID-19 in the control of DM and its complications.*
Home visits or face-to-face consultations.
Control of exams, monitoring of glycemic control and stress.
Maintenance of support groups in virtual rooms.*
Availability and guidance for the use of educational materials and digital technologies for diabetes control.*
(Re)Orientation of individualized diet, encouraging the preparation of food at home without the use of processed foods.
Exchange of recipes for diabetics for virtual strategies and video lessons for making meals for diabetics.*
Encouraging regular physical activity for the period of total or partial social isolation: bicycles, steps or treadmills, exercises using body weight, jumping rope and suggestions for physical and stretching activities available online.*
Evaluation and guidance of physical trainer through virtual means.

*Activities and/or care applied to the reality of the Acting and Educating group (in)face of Diabetes mellitus.

Study limitations

As a limitation of this study, the partial implementation and non-evaluation of the proposed activities (hypotheses of solution/application to reality) are pointed out.

Contributions to practice

Faced with the need to produce and share knowledge, in this current moment of health care in the face of COVID-19, it is considered that the results presented here are significant and can contribute to reflection and implementation of actions by other professionals.

CONCLUSION

Theoretical results endorse the risk of people with diabetes to infections and that this risk increases with exposure to the new coronavirus and adds to the complications triggered by COVID-19. They reaffirm the importance of controlling diabetes using drug and non-drug strategies. They portray the relevance of adopting treatments and other strategies that allow the immune balance to prevent COVID-19. Highlights the use of various technologies including remote technologies. Thus, it is noteworthy that the distance care strategies implemented in the face of the COVID-19 pandemic are seen as strategies that are helping the current times of health care, but that are transforming care, with high acceptability by the population and health professionals.

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