PHARMACOTHERAPEUTIC FOLLOW-UP OF A PATIENT WITH MULTIMORBITIES: EXPERIENCE REPORT

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ABSTRACT: Chronic non-communicable diseases are growing global health problems. The objective of this study was to promote pharmaceutical care for a patient with multimorbidities in order to improve its quality of life. A pharmacotherapeutic follow-up was performed using the SOAP method, registered in the form of clinical evolution, along with laboratory tests, anthropometric measurements and application of validated instruments to assess pharmacological adherence, mental health and quality of life. The report deals with a female patient, 55 years old, obese and dyslipidemic, sedentary, hypertensive, diabetic and on the control phase of breast cancer. Self-medication with antibiotics and a proton pump inhibitor was identified. Despite the good pharmacological adherence, the patient had decompensated diabetes, accompanied by dyslipidemia without treatment and interruption of supplements. After pharmacological and non-pharmacological interventions, the patient showed a significant improvement in the reduction of anthropometric measurements and in biochemical parameters. At the end of the follow-up, pharmaceutical care proved to be fundamental in identifying the patient's health problems, contributing to obtain a more rational pharmacotherapy.
KEYWORDS: Chronic Noncommunicable Diseases; Multimorbidity; Pharmaceutical Care.

ACOMPANHAMENTO FARMACOTERAPÊUTICO EM PACIENTE COM MULTIMORBIDADES: UM RELATO DE EXPERIÊNCIA

RESUMO: As doenças crônicas não transmissíveis são problemas de saúde globais crescentes. O objetivo deste estudo foi promover a assistência farmacêutica a um paciente com multimorbidades, a fim de melhorar sua qualidade de vida. Foi realizado acompanhamento farmacoterapêutico pelo método SOAP e aplicação de instrumentos validados para avaliar adesão farmacológica, saúde mental e qualidade de vida. O relato trata de uma paciente do sexo feminino, 55 anos, obesa e dislipidêmica, sedentária, hipertensa, diabética e em fase de controle do câncer de mama. Foi identificada automedicação com antibióticos e inibidor de bomba de prótons. Apesar da boa adesão

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farmacológica, a paciente apresentava diabetes descompensado, acompanhada de dislipidemia sem tratamento e interrupção das suplementações. Após intervenções farmacológicas e não farmacológicas, a paciente apresentou melhora significativa na redução das medidas antropométricas e nos parâmetros bioquímicos. Ao final do acompanhamento, a assistência farmacêutica mostrou-se fundamental na identificação dos problemas de saúde do paciente.

PALAVRAS-CHAVE: Doenças Crônicas Não Transmissíveis; Multimorbidade; Cuidados Farmacêuticos.

SEGUIMIENTO FARMACOTERAPÉUTICO EN PACIENTES CON MULTIMORBILIDAD: INFORME DE UNA EXPERIENCIA

RESUMEN: Las enfermedades crónicas no transmisibles constituyen un creciente problema de salud mundial. El objetivo de este estudio fue promover la asistencia farmacéutica a un paciente con multimorbilidades para mejorar su calidad de vida. Se realizó seguimiento farmacoterapéutico por el método SOAP y aplicación de instrumentos validados para evaluar adherencia farmacológica, salud mental y calidad de vida. O relato trata de uma paciente do sexo feminino, 55 anos, obesa e dislipidêmica, sedentária, hipertensa, diabética e em fase de controle do câncer de mama. Se identificó automedicación con antibióticos e inhibidor de la bomba de protones. A pesar del buen cumplimiento farmacológico, la paciente presentó diabetes descompensada, acompañada de dislipidemia no tratada e interrupción de la suplementación. Tras intervenciones farmacológicas y no farmacológicas, la paciente mostró una mejoría significativa en la reducción de las medidas antropométricas y los parámetros bioquímicos. Al final del seguimiento, la asistencia farmacéutica demostró ser fundamental en la identificación de los problemas de salud del paciente.

PALABRAS CLAVE: Enfermedades Crónicas No Transmisibles; Multimorbilidad; Atención Farmacéutica.

1. INTRODUCTION

Chronic non-communicable diseases (CNCDs) are global public health concerns that represent 41 million of the total 57 million deaths worldwide and 74% of deaths in Brazil (WHO, 2018). Described as the "invisible epidemic", mortality from NCDs exceeds that from communicable conditions, thus representing the largest cause of mortality in the world and in most low and middle-income countries (ROTH, 2018). Considering that these chronic health conditions can share a number of similar risk factors, it is not uncommon to find more than one chronic disease in a single individual, thus highlighting the phenomenon of multimorbidity (presence of two or more chronic medical conditions in the same individual), a condition that has been increasing worldwide in the last two decades (PLOEG *et al.,* 2020).

Among the risk factors that favor the presence of multimorbidity we can highlight: type 2 diabetes mellitus (DM2), cardiovascular disease (CVD), cancer, obesity and

lifestyle, with emphasis on smoking, greater alcohol consumption and physical inactivity (CHUDASAMA *et al.,* 2020). Thus, joint exposure to these risk factors is a plausible explanation for the grouping of CNCDs in a single individual and indicates common etiological pathways (DE BOER *et al.,* 2020). For example, obesity promotes systemic inflammation, a well-described pathway for the development of cancer, CVD and DM2 (APARECIDA SILVEIRA *et al.,* 2020).

The familiar and economic impacts generated on the health system by the NCDs and multimorbidities are enormous. Its implication for individuals is profound, including death at a younger age, impairments in physical and social functioning, poor quality of life, mental health problems, high cost of care and a greater number of adverse effects, since it becomes necessary to use several medications (polytherapy) in the treatment of these comorbidities culminating in complex treatment interventions (KADAMBI, ABDALLAH, LOH, 2020).

Polytherapy in these cases, in addition to being necessary, plays a decisive role in preventing complications arising from the progression of these diseases. However, it is also related to negative health results, in addition to favoring the occurrence of drug related problems (DRPs), such as drug interactions, ineffective treatment, adverse drug reactions (ADRs), prescription errors and non-adherence to treatment (ACHTERHOF *et al.*, 2020).

In view of this reality, the pharmaceutical professional has an important role to play in the selection of the best interventions to improve polypharmacy and, consequently, in the proper management of the associated problems in order to obtain better clinical results for these patients (SHRESTHA, SHRESTHA, KHANAL, 2019) also acting on modifiable risk factors as intervention strategies, aiming to control multiple conditions instead of efforts focused only on the disease, as well as through the application of preventive and educational measures aimed at self-care, monitoring and health education as an alternative support, through the application of practical methods (STUHEC, GORENC, ZELKO, 2019). .

Therefore, pharmacotherapeutic follow-up becomes an essential tool as a health promotion strategy, aiming to guarantee the most appropriate, effective, safe and rational treatment for these patients (SYAFHAN *et al.,* 2021).Thus, the objective of this study was to provide pharmaceutical care to a patient affected by multimorbidities, aiming at obtaining better clinical results and, consequently, improving its quality of life.

2. MATERIALS AND METHODS

2.1 Experience report

M.J.S., female, brown, 55 years old, housewife, married, literate, born in the city of São Luís, on the State of Maranhão. She has been diagnosed with Systemic Arterial Hypertension (SAH) for 20 years, Type 2 Diabetes (DM2) for 12 years, bursitis in her left shoulder for 10 years, has been in menopause for 8 years. In 2000, when diagnosed with SAH, captopril was prescribed and was replaced afterwards by losartan potassium, at the patient's request, due to complaints of cough. In 2008, she was diagnosed with DM2, and metformin hydrochloride and glibenclamide were prescribed. In 2016, three boxes of omeprazole were prescribed to control stomach discomfort that could result from the pharmacotherapy employed, however its use was maintained (self-medication) for the following 4 years, without medical reevaluation, being replaced by pantoprazole sodium afterwards. In June 2017 she noticed the presence of a lump in the left breast, not seeking professional guidance at that moment. With the gradual increase of the nodule followed by hemorrhagic episodes, she decided to seek care in December, 2018. The first care was performed in the Brazilian public basic health network (SUS), and then referred to an oncology hospital, where she was diagnosed with invasive ductal carcinoma of the left breast (ICD C50.9), stage cT4bN0cMx-IIIB, documented on January 17, 2019. She started chemotherapy lasting 7 months (January to August 2019) followed by a total left mastectomy. After the surgical procedure, she underwent a cycle of 25 radiotherapy sessions with some hospitalization episodes. Currently, she continues with maintenance therapy based on monoclonal antibody (trastuzumab) non-hormonal aromatase inhibitor (anastrozole) and calcium / vitamin D supplementation with cancer monitoring every 2 months. In January 2020, due to symptoms of suspected urinary infection, the patient self-medicated antibacterial (norfloxacin), suspending its use after seven days after the improvement of the symptoms presented.

2.2 Pharmacotherapeutic follow-up strategy

A priori, it was agreed with the patient that the pharmacotherapeutic follow-up would be carried out with home consultations, alternating with interviews in a private pharmacy establishment with proper local authorization, totaling fifteen consultations. However, due to the COVID-19 pandemic, part of the home consultations (four) were replaced by online consultations via online video call. During the follow-up, anthropometric measurements were carried out as well as blood pressure and glycemic

levels assessment with specific and appropriate devices to monitor the evolution of the patient's blood pressure and blood glucose. In addition, a survey of laboratory tests carried out after medical consultation with prescribers was carried out.

For data recording, the clinical method SOAP (Subjective, Objective, Assessment, Plan) was used, involving four stages of subjective data collection (S), objective data (O), evaluation (A) and plan (P), where the information was recorded in chronological order (with the date of the consultation and the time) and in a defined way (WEED, 1968).

In addition, instruments validated in a questionnaire format were used to assist in the collection of relevant information about the patient's general health, which were applied three times during the five months of follow-up, in order to compare and validate the data before, during and after applied pharmaceutical interventions. These were carried out together with the patient and, at the end of the follow-up, a general assessment of the results achieved was made. The instruments applied were to assess the patient's medication adherence using the Beliefs about Medicines Questionnaire (BaMQ); to assess its mental health using the PHQ (Patient Health Questionnaire); and to assess its quality of life (Medical Outcome Study 36-item Short Form (MOS SF-36).

This research complied with Resolution CNS / MS No. 466, of 12/2012 and was approved by the Research Ethics Committee of the Federal University of Maranhão - UFMA (nº 17866819.6.0000.5087).

2.3 Physical and laboratory exams

Laboratory tests provided by the patient at the beginning of the follow-up showed decompensated DM2 with fasting glucose values of 326 mg / dL, presence of insulin resistance calculated by the Tyg index of 10.97, hypertriglyceridemia of 358 mg / dL, hypercholesterolemia of 387 mg / dL (Table I), in addition to the non-alcoholic fatty liver steatosis diagnosed by imaging tests reported by the patient. During the pharmaceutical consultations, anthropometric assessments were performed, showing obesity grade I (BMI = 30.04 kg / m²) with high abdominal circumference (107 cm) indicating a greater chance of developing metabolic syndrome.

Table I - General patient data obtained from laboratory tests and measured at the beginning of pharmacotherapeutic follow-up

LABORATORY EXAMS SERUM DOSAGES	JANUARY / 2020	MAY / 2020
Fasting blood glucose	326 mg / dL	259 mg / dL
Total Cholesterol	387 mg / dL	212 mg / dL

Triglycerides	358 mg / dL	322 mg / dL
HDL-Cholesterol	___	29 mg / dL
LDL – Cholesterol	___	137 mg / dL
Non-HDL-Cholesterol	___	183 mg / dL
GGT	180 U / L	___
AST	28 U / L	___
ALT	57 U / L	___
Urea	21 mg / dL	___
Creatinine	0.68 mg / dL	0.58 mg / dL
TyG Index	10.97	10.63
RATED PARAMETERS		
Height	1, 60 cm	1, 60 cm
Weight	76.90 Kg 72.40 kg	72.40 kg
Abdominal circumference	107 cm 103 cm	103 cm
Body mass index (BMI)	35, 9 Kg / m²	28,8 Kg / m²
Blood pressure *	120 x 80 mmHg	120 x 80 mmHg
Capillary glycemia	300 mg / dL	210 mg / dL

GGT - Gamma-glutamyl transferase AST - Aspartate-aminotransferase; ALT - Alanine-animotraspheres* Average of two   measurements.

During the entire follow-up, no changes in blood pressure were observed (120 x 80 mmHg), however fasting capillary glucose was altered, varying from 326 mg / dL between the months of January (Table I) to 296 mg / dL in March (data not shown).

2.4 Evaluation of pharmacotherapy and pharmacological adherence, mental health and quality of life

At the beginning of the pharmacotherapeutic follow-up, the patient's treatment was focused on the control of SAH (losartan potassium), DM2 (glibenclamide and metformin hydrochloride) and control of breast cancer (trastuzumab, anastrozole and calcium carbonate associated with vitamin D) (Table II). In addition to the prescribed therapy, the patient reported self-medication with antibacterial (norfloxacin) due to dysuria and oliguria that she had been presenting. She stopped using the antibiotic after seven days of use with remission of symptoms. She also reported self-medication of omeprazole (4 years), which she replaced with pantoprazole in the last 4 months, describing it as necessary for the prevention of gastric disorders due to the large number of drugs used (Table II).

TABLE II – Patient's pharmacotherapy for the treatment of hypertension, diabetes and maintenance of breast cancer

| DRUG / CLASS	POSOLOGY	PRESCRIPTION
Losartan Potassium 50mg Angiotensin II receptor antagonist	1 pill after breakfast / 20 years	YES
Metformin Hydrochloride 850mg Biguanides	3 pills after main meals	YES

Glibenclamide 5mg Sulphonylureas	1 pill in fasting / 20 years	YES
Trastuzumab Monoclonal antibody	IV hospital adm.	YES
Anastrozole 1mg Non-hormonal aromatase inhibitor	1 pill 10 p.m. / 4 months YES	YES
Calcium Carbonate 600mg + D3 Vitamin 200mg Vitamin supplement	1 pill 30 min after lunch / 4 months	YES
Omeprazole 20 mg # Proton pump inhibitor	1 pill in fasting 4 years	YES/NO
Pantoprazole Proton pump inhibitor	1 pill in fasting 4 months	**NO**
Norfloxacin 400mg Antibiotic	1 pill after lunch / 7 days	**NO**

D3Vitamin: Cholecalciferol; #medical prescription 3 months. IV: intravenous; adm: administration.

At the first consultation, the patient demonstrated a positive result in relation to the prescribed pharmacological adherence (BaMQ score 1.29; ideal (N / P> 1) (Figure 1A). However, during measurements of capillary blood glucose performed monthly, persistent hyperglycemia was identified, later ratified by laboratory tests of glycated hemoglobin (13%) and fasting blood glucose 326 mg / dL (Table I), possibly related to failure in the effectiveness of the medication (Gómez *et al*.,2009).

In addition, the patient presented a score suggestive of mild depression (PHQ-9: score 8; ideal scores ≤5) (Figure 1A) possibly related to concerns arising from the treatment of breast cancer and other comorbidities, reflecting on the low self-esteem identified (Bai *et al*., 2019). In addition, using the MOS SF-36, it was demonstrated that the patient had a low quality of life (Figure 1A). During the same follow-up period, the patient reported episodes of heart palpitations and insomnia.

Figure 1: Result of the *Patient Health Questionnaire* (PHQ-9) and *Beliefs about Medicines Questionnaire* (BaMQ) questionnaires before and after the interventions: A. PHQ-9: Score – 8 (mild depression); Score – 1; Score -1 (minimal depression); BaMQ: Score N / P = 1.29 (N / P > 1 greater tendency to adhere to treatment); Score N / P = 1.4; Score N / P = 1.81 (N / P > 1 greater tendency to adhere to treatment). B. Result of the *Medical Outcome Study 36-item Short Form* questionnaire (MOS SF-36) before and after the interventions. Calculation of the *Raw Scale* where the scores of the applied questionnaires are transformed into eight domains ranging from 0 (zero) to 100 (one hundred). Where 0 = worst and 100 = best for each assessed domain.
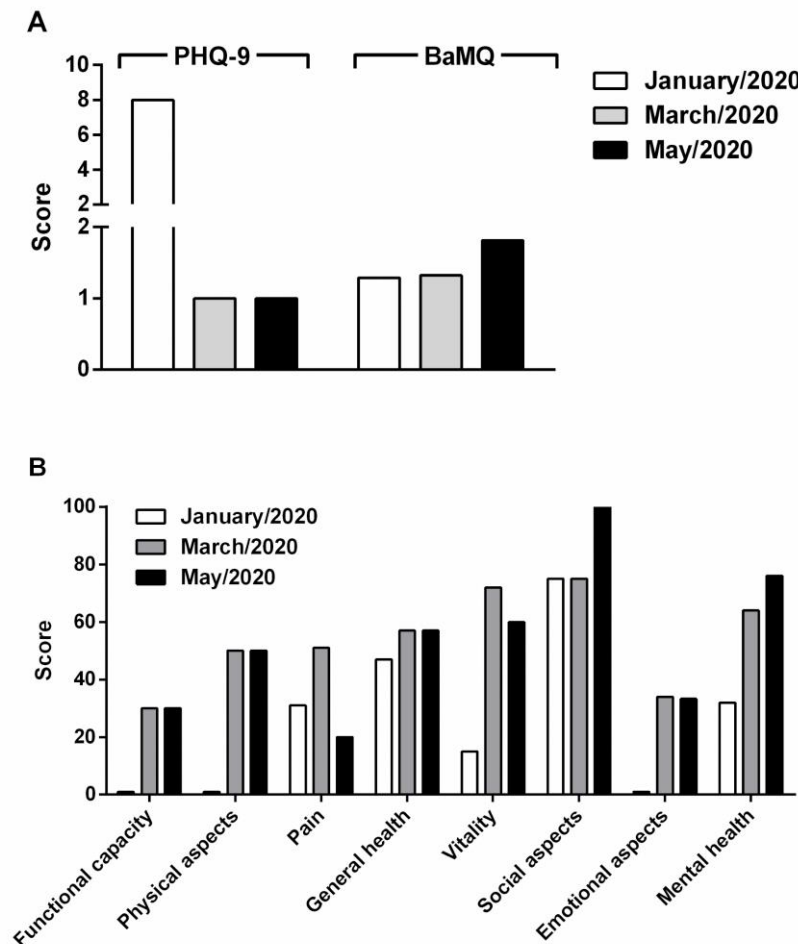
2.5 Pharmaceutical interventions

With the report of the irrational use of omeprazole / pantoprazole and norfloxacin, configuring a problem related to self-medication, the patient was advised to discontinue pantoprazole, given the countless harms that this habit can cause, like ADRs, and specifically observed with the proton pump inhibitors are directly related to chronic drug exposure (YU *et al*., 2017). Regarding the antibacterial, self-medication causes bacterial resistance among other issues, especially when used indefinitely (COLSON *et al*., 2019).

To complement the treatment of DM2 and dyslipidemia, some non-pharmacological measures were indicated aiming at better life habits, such as performing low-intensity physical activity and nutritional guidelines carried out in partnership with

the nutritionist present during the follow-up, in order to ensure the reduction of glycemic levels, lipemic and their possible complications. An organizing box was also provided, accompanied by educational guidelines about the correct storage and disposal of medicines. Concomitantly, a letter of pharmaceutical interventions was prepared for the oncologist responsible for the bimonthly follow-up of the patient, suggesting her referral to the appropriate evaluations with the specialists: cardiologist, to assess the risk of cardiotoxicity of trastuzumab, rheumatologist assessing the risk of anastrozole osteoporosis and the endocrinologist to assess decompensated DM2, despite good adherence to pharmacological therapy (Figure 1A), and the management of dyslipidemia, until then without any pharmacological or non-pharmacological treatment employed. The oncologist received the suggested guidelines and made the appropriate referrals.

Despite the proposed nutritional guidelines, the patient's blood glucose remained altered, confirming the need to adjust the dosing schedule. At the beginning of April, while the patient was still waiting for appointments with specialists by the Brazilian Unified Health System (SUS), the patient sought care at the Brazilian public basic health unit, taking the letter of pharmaceutical interventions, and was evaluated by the general practitioner, and obtained modifications in pharmacotherapy with an increase in the dose of hypoglycemic and antihypertensive drugs, as well as the insertion of the hypolipidemic drug (simvastatin) (Table III).

Table III-Additional pharmacotherapy after interventions made during follow-up

DRUG / CLASS	POSOLOGY	PRESCRIPTION
Losartan Potassium 50mg Angiotensin antagonist receptor II	1 pill after breakfast and 1 pill after dinner	YES
Glibenclamide 5mg Sulphonylureas	1 pill after breakfast and 1 pill after dinner	YES
Simvastatin 40 mg Statin	1 pill at 9 p.m. / 1 month	YES
Sodium alendronate Bisphosphonates	1 pill per week / 1 month	YES

In subsequent consultations, the patient reported episodes of weakness, dizziness and feeling faint, which started about three weeks after adjusting the antihypertensive. At the time, the patient was asked to resume the previous dosing schedule, since the BP was adequately controlled before the modification proposed by the clinician, indicating a safety drug related problem (DRPs) (ACHTERHOF *et al.*, 2020)   and a new evaluation by the cardiologist was recommended. Weekly BP monitoring was started until it returned to 120x80 mmHg (Table I).

In early May, in view of the reported deficit in manual pressure strength, muscle pain and in the joints of the wrists, hands and lower limbs, the risk of musculoskeletal injury associated with the use of statins was suspected. However, this hypothesis was ruled out because the patient reported having interrupted the use of vitamin and mineral supplement (Calcium + Vit. D) in the last three months, which has a protective action against anastrozole-induced osteoporosis, DRPs due to the improper discontinuation of the medication (TANAKA, ITOH, TAKEUCHI, 2018). In addition, after the rheumatologist's evaluation, she was diagnosed with osteoporosis and at that time sodium alendronate was prescribed (Table III). Other factors that may have contributed to the muscle pain and the deficit in manual strength observed are chemotherapy and radiotherapy. Thus, this set of factors justifies the reported complaints and the reduction in the pain (20) and vitality (60) scores identified at the end of May (Figure 1B).

After the interventions, the patient's last exams at the end of May showed improvement in her clinical condition, with a significant reduction in fasting blood glucose levels (186 mg / dL) confirming the need for dose adjustment, total cholesterol (212 mg / dL) and triglycerides (322 mg / dL) (Table I), as a direct consequence of better nutritional habits adopted in conjunction with the modification of pharmacotherapy. As well as significant weight reduction (-4.5 kg), waist circumference (-4 cm) and change in status from grade I obesity to overweight (Table I). There was also an improvement in mental health status (PHQ-9: score 01; ideal scores ≤5) (Figure 1A) possibly related to improvement in anthropometric levels (Figure 1), maintenance of adherence score (BaMQ: score 1, 3; ideal (N / P> 1) (Figure 1A), which directly reflected in the improvement of the patient's quality of life with the increase in most domains assessed by MOS SF-36 (Figure 1B).

Because it is an experience report, the following work is consistent with the ethical standards required for human investigations.

3. RESULTS AND DISCUSSION

With the increase in life expectancy of the Brazilian population in recent decades, there has also been a change in patterns of morbidity and mortality, especially with regard to the increase in the prevalence of diseases related to senescence such as NCDs and multimorbidities, which generate great impact in Brazilian public health (LIMA-COSTA *et al*., 2018). Individuals with breast cancer (BC) represent a unique and extremely complex group of patients who also have pre-existing NCDs, which further increases the

risk of adverse reactions, drug interactions and other specific problems related to the toxicity of oncological pharmacotherapy (BODAI, TUSO, 2015). In BC therapy, the risk of peripheral neuropathy, myelosuppression, hepatotoxicity, ototoxicity, pancreatitis, cardiotoxicity, osteopenia and osteoporosis, can last a lifetime and often have debilitating effects on the patient's physical and psychological well-being (MARKS *et al*., 2010). Cardiotoxicity is one of the most significant adverse effects of cancer treatment; as described, the patient uses trastuzumab. Although the exact intracellular mechanisms associated with the cardiotoxicity of trastuzumab are not yet known, they are believed to be related to its inhibitory action on cardiac signaling of the HER2 receptor responsible for the development and survival of cardiomyocytes. This chemotherapy induces a reversible transient dysfunction of cardiomyocytes independent dose, showing less cardiotoxic potential when compared to other chemotherapeutic drugs (SADEK *et al.,* 2017), however, in conjunction with other diseases such as DM2, there is a greater risk, requiring monitoring of the cardiac profile. In this sense, a letter was sent to the oncologist responsible for monitoring the patient, alerting to the need for cardiac evaluation in view of the presence of risk.

Another adverse effect related to CM therapy is the development of bone loss, osteopenia and osteoporosis due to adjuvant therapies. Chemotherapy can directly inhibit bone proliferation and, together with ovarian suppression, reduce bone renewal via estrogen, which is decreased at menopause, thus increasing the risks of osteoporosis and osteopenia in these patients. As described, the patient uses an aromatase inhibitor (AI) and is in menopause, both factors involved with the greatest risk of developing osteoporosis. AIs are the treatment of choice for hormone-responsive BC in most postmenopausal women due to better efficacy and less serious side effects. However, as IA prevent peripheral estrogen production, they suppress circulating estrogen levels, causing accelerated bone loss and an increased risk of fractures (YAO *et al*., 2020).

Furthermore, DM2 is another one of the many chronic conditions associated with the development of osteoporosis (MUSCHITZ *et al.,* 2019). In this context, patients at increased risk of bone loss should undergo bone densitometry (BMD) within 3 months after AI therapy accompanied by supplementation and preventive therapy to prevent bone loss (OTTANELLI, 2015). The patient stopped using the vitamin and mineral supplement for financial reasons, characterizing a DRP's due to the patient's improper discontinuation of the medication (ACHTERHOF *et al*., 2020), which probably contributed to the

development of osteoporosis, as well as weakness and muscle pain, diagnosed at the end of follow-up.

Another worrying factor observed was the practice of self-medication with proton pump inhibitors (PPIs) and an antibacterial agent. Self-medication is a global health problem with serious public health implications, including delayed or no response to treatment, drug resistance and organ damage (FEREIDOUNI, KAMELI MORANDINI, NAJAFI KALYANI, 2019). PPIs have been increasingly used in recent decades, raising growing concerns about overuse and the numerous side effects reported such as dementia and bone fractures possibly due to hypochlorhydria and hypergastrinemia caused by these drugs. Hypochlorhydria reduces the absorption of minerals and vitamin B complex (B6 and B12) and folate, while hypergastrinemia reduces the differentiation of osteoclast precursors and increases bone loss (LIU *et al*., 2019). These mechanisms have been shown to be associated with an increased risk of recurrent falls in elderly and postmenopausal women, possibly related to reduced absorption of minerals and vitamin B complex that are also already reduced in menopause (WANG *et al*., 2019). As previously described, the patient makes chronic use of PPIs without indication, an additional risk factor for the development of osteoporosis, which, in addition to pre-existing risk factors such as menopause, use of AI and lack of vitamin supplementation, contributed to the development of osteoporosis.

The practice of self-medication with antibacterials is an important factor that promotes the development of bacterial resistance, occurring mainly due to inappropriate use, inadequate dose and incomplete treatment time, which contributes to the selection of resistant strains and the spread of resistance genes. Together, these factors contribute to the decrease in the effectiveness of pharmacotherapy by requiring the administration of second-line drugs, which are generally more toxic and expensive, causing damage to the patient and increasing the time and costs for the individual and the health system (HIGUERA-LLANTÉN *et al*., 2018).

In view of this analysis, it is necessary to emphasize the importance of patient education in relation to some of the sequelae of NCDs and their treatment (MAGNUSSON *et al.*, 2019). In this sense, educational strategies are the main focus with the objective of making the patient aware of his clinical condition, as well as guiding him towards behavioral changes in lifestyle (CORTEZ *et al.*, 2017). The main guidelines were about eating habits, developed through individualized nutritional counseling that included educational materials for a diet with increased intake of fiber, whole products, fruits and

vegetables, combined with the regular practice of physical exercises aiming at weight reduction to reduce associated risk factors and consequently improve clinical results (UUSITUPA *et al*., 2019). The analysis of the patient's BMI and waist circumference before and after the interventions showed a significant improvement with a change from grade I obesity to overweight at the end of the follow-up, indicating a positive result related to adherence to nutritional guidelines, which also reflected in the reduction of the mental health scores of the patient. Therefore, individuals with lower BMIs had a lower risk of multimorbidities, and the reduction in waist circumference reduces metabolic risk factors (ZHANG *et al*., 2020).

Adipose tissue is responsible for producing numerous adipocytokines such as leptin, resistin, adiponectin, interleukin-6, tumor necrosis factor and visfatin that are directly involved in the low-grade inflammatory process, macrovascular complications and the condition of insulin resistance observed in obese and DM2 patients (HUANG *et al*., 2017). Obesity and excessive consumption of foods rich in carbohydrates and fats are associated with the development of other chronic diseases such as non-alcoholic fatty liver disease, cardiovascular diseases and DM2, as well as the development of depressive symptoms (MULUGETA *et al*., 2018).

Although the reduction in the TyG index in the patient was discreet, it is known that this is an important marker for identifying insulin resistance (IR) and also predictive for DM2 and metabolic syndrome (SHIN, KIM, 2019). It is also positively associated with a higher prevalence of subclinical or symptomatic coronary artery disease, in addition to arterial stiffness and microvascular damage (PARK *et al.,* 2020). Current epidemiological evidence has shown that the TyG index is predictive of more severe cases and higher mortality in patients with COVID-19 (REN *et al.*, 2020). In addition, the improvement in biochemical parameters in relation to the patient's hyperglycemia and hypercholesterolemia proved to be considerable, obtained through the implementation of non-pharmacological measures applied in conjunction with the interventions performed in her pharmacotherapy, through adjustment of dosage and incorporation of other medications by the prescriber regarding the detection and information of the MRPs identified during the pharmacotherapeutic follow-up.

The state of chronic hyperglycemia in decompensated DM2 can trigger several macrovascular complications, which compromise the microvascular arteries and vessels that specifically affect the peripheral nerves and the retina in addition to diabetic ketoacidosis and the hyperglycemic state involved with increased risk of hospitalization

and death if not treated properly (FAYFMAN, PASQUEL, UMPIERREZ, 2017). Thus, the role of the pharmacist in the multidisciplinary team in controlling the hyperglycemia of patients with decompensated DM2 reduces microvascular and macrovascular complications, improving the quality of life of these individuals (PATEL, TRIPLITT, TRUJILLO, 2019).

In this context, the role of the pharmacist in the monitoring of patients affected by multimorbidities produces numerous benefits, as it contributes to the control of chronic conditions, promotes patient awareness about themes transversal to health promotion, in addition to encouraging self-care by intervening in a positive way on the behavior and adoption of healthier habits, also improving the communication between patients and their doctors, positively impacting the quality of life and adherence to pharmacotherapy in a rational way (PATEL, TRIPLITT, TRUJILLO, 2019; SCHINDEL, BREAULT,HUGHES, 2019).

4. CONCLUSION

The high prevalence of non-communicable chronic diseases among the population leads to polypharmacy and a greater risk of drug-related problems and, in this scenario, pharmacotherapeutic monitoring becomes essential to guarantee a more appropriate treatment. In the present experience report, we used validated tools to identify real health problems, careful evaluation of pharmacotherapy combined with observation and active listening to the signs and symptoms reported by the patient, which allowed us to demonstrate that the proposed interventions led to favorable outcomes in terms of clinical conditions and patient's quality of life. Besides, the study strengthens the importance of the pharmacist in the scenario of multicomorbidities and polytherapy to assist in pharmacotherapy. Even though the interventions presented led to a positive outcome, our study was limited to evaluating the patient until the final referrals, without monitoring the results presented by the new treatments. Bearing in mind that drug therapy and polypharmacy are necessary in the treatment of multimorbidities on an ongoing basis, it is also necessary to give continuity to pharmaceutical care services, contributing to obtaining a more rational pharmacotherapy. Finally, this study serves as a foundation for future work in the field of oncological diseases, polypharmacy, multimorbidity and pharmacotherapeutic monitoring. Finally, this study serves as a basis for the future planning of new tools and screening scores, as well as population studies covering oncological diseases, polypharmacy, multimorbidity and pharmacotherapeutic follow-up,

aiming at discussing more effective public policies for the prevention of these morbidities and better health promotion.

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