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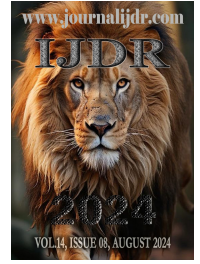
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ASSESSMENT OF MEDICATION DISCONTINUATION IN HYPERTENSIVE AND DIABETIC PATIENTS AFTER BARIATRIC AND METABOLIC SURGERY

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ABSTRACT

Introduction: Epidemiological studies show a significant acceleration in the prevalence of obesity in Brazil and worldwide, making it a public health issue, primarily due to the increased risk of diseases such as systemic arterial hypertension (SAH) and type 2 diabetes mellitus (T2DM). The first-line treatment for obesity is lifestyle modifications and pharmacological measures. However, while these measures initially bring significant improvements, they struggle with long-term weight loss maintenance and control of comorbidities, making bariatric and metabolic surgery the better option in these cases. Bariatric surgery is performed on patients with a Body Mass Index (BMI) ≥ 35 with comorbidities or ≥ 40 . Metabolic surgery is indicated for individuals with a BMI between 30 and 34.9 with difficult-to-control diabetes. There are various techniques described for obesity surgery, but the most commonly performed worldwide and in Brazil are Roux-en-Y gastric bypass (RYGB) and vertical sleeve gastrectomy (sleeve). **Objective:** To assess the remission of medication use for treating systemic arterial hypertension and type 2 diabetes mellitus in patients who underwent bariatric and metabolic surgery at the Hospital Regional da Asa Norte. **Methodology:** Observational, retrospective, cross-sectional study conducted through data collection from pre- and post-operative records of patients who underwent bariatric and metabolic surgery at the Hospital Regional da Asa Norte between 2019 and 2022, with a prior diagnosis of SAH and T2DM. After data collection, patients were classified as: total remission, partial reduction, or no reduction in medication use. **Results:** Regarding the use of antihypertensive drugs, there was total remission in 56.25% of individuals, partial reduction in 15.63%, and no reduction in 28.12%. For the use of medications for T2DM treatment, total remission occurred in 70% of participants, partial reduction in 25%, and no reduction in 5%. **Conclusion:** Significant remission in medication use for both SAH and T2DM was identified in patients undergoing bariatric and metabolic surgery at the Hospital Regional da Asa Norte.

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INTRODUCTION

Obesity is characterized by the accumulation of fat tissue leading to an increase in Body Mass Index (BMI) to 30 kg/m² or higher. Epidemiological studies have shown a significant acceleration in its prevalence in Brazil and worldwide, making it a public health issue, primarily due to obesity being a risk factor for chronic diseases such as type 2 diabetes mellitus (T2DM) and systemic arterial hypertension (SAH), as well as other comorbidities that lead to metabolic syndrome and increased cardiovascular risk^{1,2,3,4,5}. Therefore, weight control has long been recognized as an effective treatment in managing these diseases¹. Systemic arterial hypertension is one of the most important cardiovascular risk factors, and its relationship with overweight and obesity is well established. The prevalence of SAH among obese patients ranges from 60% to 77%, increasing with BMI across all age groups. This rate is significantly higher compared to the 34% of SAH found in individuals with normal weight.

Both obesity and hypertension are considered cardiovascular risk factors, so their combined management is of utmost importance. Proper weight control has a significant effect on reducing blood pressure in hypertensive patients. Moreover, the greater the excess weight loss, the better the results in terms of reducing cardiovascular risk. In obese patients with metabolic syndrome, moderate weight loss improves renal function and can lead to a 15% reduction in all-cause mortality⁶. Type 2 diabetes mellitus is one of the most prevalent diseases globally in adults and is among the leading causes of loss of healthy years of life⁷. It is a chronic disease affecting 3% of the global population, with a significant increase in prevalence in recent years due to an aging population⁸. In 2015, the International Diabetes Federation estimated that one in every 11 adults aged 20 to 79 had type 2 diabetes⁹. Dietary treatment and lifestyle changes are fundamental pillars in managing obesity and T2DM (weight loss $\geq 3\%$ in T2DM patients improves glycemic control), but the results are often poor and difficult to assess. Recently, the use of various

medications for obesity treatment has been approved, which helps improve T2DM control by promoting weight loss. Similarly, there are drugs for T2DM treatment that have a beneficial effect on weight, such as SGLT-2 inhibitors and GLP-1 analogs¹⁰. In combating obesity, the first line of treatment involves dietary modifications and lifestyle changes, followed by pharmacological therapy, a strategy that is becoming increasingly effective with fewer associated side effects. However, despite providing good weight loss rates, these measures do not demonstrate satisfactory long-term maintenance of excess weight loss^{1,2,5,11}. Additionally, controlling SAH and T2DM, along with other comorbidities in obese patients, remains challenging, even with the growing emergence of more effective medications. Thus, surgical treatment for obesity is growing as a more effective means of achieving sustained weight loss in the long term and better control of comorbidities^{1,2,11}. According to the World Health Organization (WHO) and the Federal Council of Medicine (CFM), surgical treatment of obesity includes bariatric surgery, indicated for individuals with grade III obesity or higher (BMI ≥ 40 kg/m²) and individuals with grade II obesity (BMI between 35 and 40 kg/m²) who have associated comorbidities⁵, and metabolic surgery, which is indicated for patients with grade I obesity (BMI between 30 and 34.9 kg/m²) with difficult-to-control T2DM, focusing mainly on controlling this and other comorbidities associated with metabolic syndrome⁷. It is well-established that patients undergoing these surgeries achieve better long-term maintenance of excess weight loss, with better control of comorbidities such as SAH and T2DM^{1,2,11}. It is also known that the remission of some or all medications used preoperatively occurs early after surgery, even before significant weight loss. Studies have shown that incretin mechanisms are related to blood pressure and glycemic control in the postoperative period of bariatric and metabolic surgery, regardless of weight loss¹². Various techniques are described for performing bariatric and metabolic surgery worldwide, including adjustable gastric band, vertical sleeve gastrectomy (sleeve)—purely restrictive techniques—Roux-en-Y gastric bypass (RYGB), and biliopancreatic diversion with or without duodenal switch—restrictive and malabsorptive techniques⁸. Among these techniques, sleeve is the most commonly performed worldwide, followed by RYGB. In Brazil, the order is reversed, with RYGB being the most frequently used technique. It is known that these two techniques provide good weight loss rates, with low complication rates and favorable results in controlling comorbidities such as SAH and T2DM^{1,5}. The Hospital Regional da Asa Norte offers Bariatric and Metabolic Surgery services, performing laparoscopic surgeries focusing both on obesity treatment and associated comorbidities, maintaining a permanent multidisciplinary team for pre- and post-operative support, including nutritionists, psychologists, social workers, endocrinologists, and surgeons.

Objectives

General Objective: To assess the overall remission of medication use for the treatment of systemic arterial hypertension and type 2 diabetes mellitus in patients undergoing bariatric and metabolic surgery at the Hospital Regional da Asa Norte.

Specific Objectives: To evaluate medication remission in individuals with grade I obesity who underwent metabolic surgery:

- a) Regarding the use of antihypertensive medications
- b) Regarding the use of hypoglycemic medications

To evaluate medication remission in individuals with grade II or higher obesity who underwent bariatric surgery:

- a) Regarding the use of antihypertensive medications
- b) Regarding the use of hypoglycemic medications

MATERIALS AND METHODS

This research was authorized by the Ethics and Research Committee (CEP), with Certificate of Ethical Appreciation Presentation (CAAE)

No. 66862523.6.0000.5553 and Opinion Number: 5,929,022. This is a retrospective, observational, cross-sectional study conducted at the Hospital Regional da Asa Norte. It involved analyzing the medical records of obese individuals diagnosed with isolated or combined type 2 diabetes mellitus (T2DM) and systemic arterial hypertension (SAH), who underwent bariatric surgery (BMI ≥ 35 kg/m²) or metabolic surgery (BMI between 30 and 34.9 kg/m²) using the Roux-en-Y gastric bypass technique between 2019 and 2022.

Inclusion Criteria

- Patients with a BMI between 30 and 34.9 kg/m², diagnosed with difficult-to-control T2DM diagnosed less than 10 years ago, according to CFM protocol, with associated SAH, who underwent metabolic surgery at the Hospital Regional da Asa Norte.
- Patients with a BMI between 30 and 34.9 kg/m², diagnosed with difficult-to-control T2DM diagnosed less than 10 years ago, according to CFM protocol, without associated SAH, who underwent metabolic surgery at the Hospital Regional da Asa Norte.
- Patients with a BMI ≥ 35 kg/m², according to CFM protocol, with a diagnosis of both T2DM and SAH, who underwent bariatric surgery at the Hospital Regional da Asa Norte
- Patients with a BMI ≥ 35 kg/m², according to CFM protocol, with a diagnosis of T2DM without associated SAH, who underwent bariatric surgery at the Hospital Regional da Asa Norte.

Exclusion Criteria

- Patients with insufficient data regarding pre- and post-operative medication use.
- Patients without T2DM.
- Patients who lost follow-up.
- Patients who refused to sign the Informed Consent Form (ICF) for the research.

The diagnostic criteria for T2DM and SAH were based on the use of hypoglycemic and antihypertensive medications, respectively, in the pre-operative period, regardless of variety, class, or dose. The number and dose of medications used by each patient were recorded before and after the procedure to compare the need for these medications post-operatively. Patients were then classified into:

- **Total Remission:** If all medications were discontinued without new glycemic or hypertensive spikes requiring resumption of medications during the follow-up period.
- **Partial Reduction:** If there was a reduction in the number or dose of medications, or if all medications were discontinued but some were required to be resumed during follow-up.
- **No Reduction:** If it was not possible to reduce the number or dose of medications, or if medications were discontinued but later resumed or replaced with more potent medications. Comorbidities (SAH and T2DM) were analyzed concerning medication use and classified separately according to the above criteria.

RESULTS

The medical record review identified 61 individuals who underwent bariatric and metabolic surgery between 2019 and 2022 at the Hospital Regional da Asa Norte. Of these, 42 had a diagnosis of type 2 diabetes mellitus (T2DM), with one lacking sufficient data in the records due to loss to follow-up after surgery. One patient had a diagnosis of systemic arterial hypertension (SAH) but without associated T2DM. No patients refused to sign the Informed Consent Form (ICF). Therefore, the study included 40 participants, with 15 (37.5%) undergoing metabolic surgery and 25 (62.5%) undergoing bariatric surgery. Among the sample, 32 participants (80%) had a diagnosis of SAH before the procedure, and all had a diagnosis of

Table 1. Reduction in the use of antihypertensive medications in patients undergoing bariatric and metabolic surgery at the Regional Hospital of Asa Norte, who were diagnosed with hypertension (N=32)

Result	After metabolic surgery	After bariatric surgery	General
Total remission	6 (18,75%)	12 (37,5%)	18 (56,25%)
Partial reduction	1 (3,13%)	4 (12,5%)	5 (15,63%)
No reduction	1 (3,13%)	8 (25%)	9 (28,12%)
Total patients	8 (25%)	24 (75%)	32 (100%)

Table 2. Reduction in the use of antihypertensive medications by patient group undergoing bariatric and metabolic surgery at the Regional Hospital of Asa Norte who had a diagnosis of hypertension

Result	After bariatric surgery	General
Total remission	6 (75%)	12 (50%)
Partial reduction	1 (12,5%)	4 (16,67%)
No reduction	1 (12,5%)	8 (33,33%)
Total patients	8 (100%)	24 (100%)

Table 3. Reduction in the use of hypoglycemic medications in patients undergoing bariatric and metabolic surgery at the Regional Hospital of Asa Norte, who had a diagnosis of hypertension (N=40)

Result	After metabolic surgery	After bariatric surgery	General
Total remission	9 (22,5%)	19 (47,5%)	28 (70%)
Partial reduction	6 (15%)	4 (10%)	10 (25%)
No reduction	0 (0%)	2 (5%)	2 (5%)
Total patients	15 (37,5%)	25 (62,5%)	40 (100%)

Table 4. Reduction in the use of hypoglycemic medications by group in patients undergoing bariatric and metabolic surgery at the Regional Hospital of Asa Norte, who had a diagnosis of hypertension

Result	After metabolic surgery	After bariatric surgery
Total remission	9 (60%)	19 (76%)
Partial reduction	6 (40%)	4 (16%)
No reduction	0 (0%)	2 (8%)
Total patients	15 (100%)	25 (100%)

Table 4. Reduction in the use of hypoglycemic medications by group in patients undergoing bariatric and metabolic surgery at the Regional Hospital of Asa Norte, who had a diagnosis of hypertension

Result	After metabolic surgery	After bariatric surgery
Total remission	9 (60%)	19 (76%)
Partial reduction	6 (40%)	4 (16%)
No reduction	0 (0%)	2 (8%)
Total patients	15 (100%)	25 (100%)

T2DM. Regarding SAH, Table 1 shows that, of the 32 individuals in the sample using antihypertensive drugs pre-operatively, 18 (56.25%) achieved total remission of medication use, with 6 (18.75%) in the metabolic surgery group and 12 (37.5%) in the bariatric surgery group. It is also noted that 5 participants (15.63%) had partial reduction in the use of antihypertensive medications, including 1 (3.13%) who underwent metabolic surgery and 4 (12.5%) who underwent bariatric surgery. Additionally, 9 individuals (28.12%) did not experience a reduction in the use of antihypertensive drugs, including 1 (3.13%) who had metabolic surgery and 8 (25%) who had bariatric surgery. Regarding SAH, Table 2 shows the percentage reduction in medication use within each group. Among the patients who underwent metabolic surgery, totaling 8 participants, 75% achieved total remission of antihypertensive use, 12.5% had partial reduction, and 12.5% did not experience any reduction. In the post-bariatric surgery group, with a total of 24 individuals, 50% achieved total remission of antihypertensive drugs, 16.67% had partial reduction, and 33.33% did not experience any reduction.

Regarding T2DM* Table 3 shows that out of the 40 individuals (all study participants), 28 (70%) achieved total remission, 10 (25%) had partial reduction, and 2 (5%) did not experience any reduction in the use of hypoglycemic medications. In the group who underwent metabolic surgery, totaling 15 participants (37.5%), 9 (22.5%) achieved total remission of hypoglycemic medication use, 6 (15%) had partial reduction, and none experienced no reduction in medication use after the surgical treatment. Among those who underwent bariatric surgery, totaling 25 participants (62.5%), 19 (47.5%) achieved total remission, 4 (10%) had partial reduction, and 2 (5%) did not experience any reduction in the use of hypoglycemic medications. Regarding T2DM, Table 4 shows the rate of reduction in medication use among the members of each group.

In the group that underwent metabolic surgery, consisting of 15 individuals, 9 of them (60%) achieved total remission, 6 (40%) had partial reduction, and none of the patients experienced no reduction in the use of hypoglycemic medications after surgery. In the group that underwent bariatric surgery, totaling 25 participants, 19 (76%) achieved total remission, 4 (16%) had partial reduction, and 2 (8%) did not experience any reduction in the use of DM2 medications. Table 5 shows the remission rate specific to each antihypertensive medication after the surgeries performed. A total remission of 52% is observed with the use of Losartan, with 83.33% in individuals who underwent metabolic surgery and 42.11% in those who underwent bariatric surgery. Hydrochlorothiazide had a remission of its use in 75% of participants, with 100% in those who underwent metabolic surgery and 66.67% in those who underwent bariatric surgery. Amlodipine had a total remission of use in 85.71% of cases, with 50% in the metabolic surgery group and 100% in the bariatric surgery group. Additionally, several medications were used by only one patient before the surgery and had their use discontinued after the procedure, achieving 100% remission in this study. Similarly, Metoprolol, which was used by only one participant, was not discontinued after the surgery and had a remission rate of 0%. The overall remission rate of antihypertensive medications in both groups was 65.75%, with 84.21% and 59.26% of the medications used preoperatively being discontinued after metabolic and bariatric surgery, respectively. Regarding medications for type 2 diabetes (DM2), Table 6 shows the specific remission rate of each medication after the procedures. There is a 100% reduction in the use of nearly all insulins, except for NPH insulin, which has a remission rate of 92.31%, with 100% remission in patients who underwent metabolic surgery and 80% in those who had bariatric surgery. Additionally, other medications that had a 100% remission after surgery include Pioglitazone, Vildagliptin, Liraglutide, Empagliflozin, and Sitagliptin.

Table 5. Medications used for controlling arterial hypertension before and after metabolic and bariatric surgery at the Regional Hospital of Asa Norte

Drugs	Metabolic Surgery			Bariatric Surgery			General		
	Pre	Post	Reduction	Pre	Post	Reduction	Pre	Post	Reduction
Captopril	-	-	-	2	0	100%	2	0	100%
Enalapril	2	1	50%	1	1	0%	3	2	33,33%
Valsartan	-	-	-	1	0	100%	1	0	100%
Losartan	6	1	83,33%	19	11	42,11%	25	12	52%
Atenolol	1	0	100%	8	3	62,5%	9	3	66,67%
Propranolol	1	0	100%	-	-	-	1	0	100%
Metoprolol	-	-	-	1	1	0%	1	1	0%
Amlodipine	2	1	50%	5	0	100%	7	1	85,71%
Hydrochlorothiazide	2	0	100%	6	2	66,67%	8	2	75%
Chlorthalidone	-	-	-	1	0	100%	1	0	100%
Indapamide	2	0	100%	5	2	60%	7	2	71,43%
Spirolactone	1	0	100%	2	1	50%	3	1	66,67%
Furosemide	1	0	100%	1	0	100%	2	0	100%
Hydralazine	-	-	-	1	0	100%	1	0	100%
Atensina	1	0	100%	1	1	0%	2	1	50%
Total	19	3	84,21%	54	22	59,26%	73	25	65,75%

Table 6. Medications used by diabetic patients before and after metabolic and bariatric surgery at the Regional Hospital of Asa Norte

Drugs	Metabolic Surgery			Bariatric Surgery			General		
	Pre	Post	Reduction	Pre	Post	Reduction	Pre	Post	Reduction
NPH Insulin	8	0	100%	5	1	80%	13	1	92,31%
Insulin Glargine	3	0	100%	-	-	-	3	0	100%
Insulin Degludec	1	0	100%	-	-	-	1	0	100%
Regular Insulin	3	0	100%	2	0	100%	5	0	100%
InsulinGlulisine	-	-	-	1	0	100%	1	0	100%
Insulin Aspart	1	0	100%	-	-	-	1	0	100%
Liraglutide	1	0	100%	-	-	-	1	0	100%
Metformin	13	6	53,85%	23	2	91,3%	36	8	77,78%
Gliclazide	5	1	80%	0	1	aumento	5	2	60%
Pioglitazone	2	0	100%	1	0	100%	3	0	100%
Empaglifozin	1	0	100%	-	-	-	1	0	100%
Dapaglifozin	2	2	0%	3	2	33,33%	5	4	20%
Vildagliptin	1	0	100%	-	-	-	1	0	100%
Sitagliptin	-	-	-	1	0	100%	1	0	100%
Alogliptin	2	2	0%	-	-	-	2	2	0%
Total	43	11	74,42%	36	6	83,33%	79	17	78,48%

Metformin, which was the most used medication before surgery (36 participants), had a remission rate of 77.78%, with 53.85% of those being people who underwent metabolic surgery and 91.3% who underwent bariatric surgery. Alogliptin was the only drug that did not have complete remission in any of the participants who were using it before surgery. The overall remission rate for hypoglycemic medications was 78.48%.

DISCUSSION

Type 2 diabetes mellitus (DM2) and hypertension are diseases commonly associated with obesity. The exact cause of hypertension (HTN) in obese patients is still not fully understood. Classically, hypertension in obese individuals is attributed to plasma volume expansion and increased cardiac output due to excess body mass, along with a concomitant decrease in natriuresis. However, other mechanisms, such as the increased activation of the renin-angiotensin-aldosterone system (RAA) due to renal compression by visceral fat found in advanced stages of obesity, could also explain the presence of this condition. Nevertheless, none of these theories explain the fact that bariatric and metabolic surgery has a profound antihypertensive effect within the first 10 days postoperatively, long before any significant weight reduction. This fact strongly suggests that incretins (hormones produced in the gut in response to food intake) may play a significant or at least important role in obesity-related hypertension^{11,14}. Regarding DM2, it is known that the remission of some or all medications used preoperatively occurs early after surgery, even before significant weight loss, supporting the hypothesis that these patients do not achieve control of these comorbidities solely due to weight loss, but also due to the action of

incretins (GLP-1, PYY, ghrelin, among others), gastrointestinal hormones whose production is increased or decreased after surgery, leading to better control of hunger and satiety, as well as playing a role in controlling comorbidities such as HTN and DM2⁷. It is well known that early control of HTN and DM2 is essential to prevent their worsening. Bariatric and metabolic surgery offers benefits in preventing disease progression and stabilizing these conditions, avoiding severe complications such as acute myocardial infarction, stroke, heart disease, and peripheral and central vascular diseases. In this study, forty participants were diagnosed with DM2, and thirty-two of them (80%) also had HTN, a figure consistent with findings in the literature, which range from 59.5% to 82.1%^{2,3,4,11,15}. As for DM2, the prevalence in the literature varies from 18.2% to 58.9%, but in this study, the prevalence was 100%, as this diagnosis was an inclusion criterion for the study. Among the patients who used antihypertensive medications, 56.25% experienced complete remission of their medication use, and with a partial reduction in 15.63% of patients, it can be said that 71.88% of hypertensive individuals who underwent bariatric and metabolic surgery benefited from the surgery in terms of hypertension treatment. This rate is similar to what is found in the literature, which suggests remission rates ranging from 43% to 93%^{1,2,3,4,5,11,15}. Of the antihypertensive medications used preoperatively, 65.75% were completely discontinued in both groups. This result is significantly higher than that found in the literature, which corresponds to an overall remission rate of 47% for antihypertensive medications¹¹, possibly due to the small sample size or because this is a pioneering study involving metabolic patients, who in this study showed a greater reduction in medication use than bariatric patients (87.5% versus 66.67%). There are no studies in the scientific community comparing the results of bariatric surgery with metabolic surgery in terms of medication remission, as the latter is a modality that has only recently begun to

be used worldwide. Regarding the reduction in the use of hypoglycemic medications, we observed that 70% of the participants achieved complete remission of their medication use, with 25% achieving partial reduction. Thus, it can be said that 95% of patients who underwent bariatric and metabolic surgery benefited from the procedure in terms of DM2 treatment. Classically, the total remission rate of DM2 after bariatric surgeries is around 76%, but there are studies showing remission rates of up to 95%, the same rate achieved in this study². It is also possible to observe that 100% of participants had some benefit from metabolic surgery and 94% from bariatric surgery. In the case of bariatric surgery, this result is consistent with the literature. As for metabolic surgery, there are no studies involving medication remission rates. Regarding the remission of hypoglycemic medications, it is noteworthy that almost all insulins (96%) were discontinued after the surgical procedure, with good remission also observed for Metformin (77.78%), Gliclazide (60%), and several other medications. The literature shows a remission rate for insulin of 10.1%, Gliclazide of 10.1%, and Metformin of 62.6% after bariatric surgery. Of these, only Metformin is consistent with the literature, while the other medications show much higher rates. Only Alogliptin (0%) and Dapagliflozin (20%) had remission rates below 50%. These discrepant data are likely due to the lack of studies related to metabolic surgery.

In the present study, it was observed that bariatric and metabolic surgery provides significant benefits in resolving not only obesity but also the comorbidities associated with it, specifically hypertension and type 2 diabetes mellitus. There are reports of improved quality of life, increased energy for daily activities, and physical activity associated with weight loss and the reduction/remission of medication use. However, the study has limitations that should be noted, such as the small number of participants, the fact that it is not multicenter, and that despite being standardized, the surgical technique was performed by different teams, which may influence the results, making the study heterogeneous. Therefore, prospective, randomized controlled studies with larger samples are needed to provide more robust evidence, perhaps including the study of other comorbidities associated with obesity. The Regional Hospital of Asa Norte is a pioneer in the Brazilian public health system (SUS), offering a Metabolic Surgery service with a complete multidisciplinary team available to patients, from preoperative to late postoperative care. Additionally, all surgeries are performed via videolaparoscopy. The services are a reference for the Federal District and surrounding areas. However, the metabolic surgery service needs greater dissemination among the population, including doctors and healthcare teams who are unaware of this procedure, its indications, and results, leading to missed opportunities to refer patients who could benefit from the service. To make this possible, a state health policy aimed at strengthening and promoting this service needs to be implemented, in order to offer SUS users cutting-edge treatment for metabolic syndrome and obesity, and most importantly, to prevent complications and consequently improve the quality of life for these patients.

CONCLUSION

The total remission rate of antihypertensive medication use was 56.25%, with a partial reduction of 15.63% and no reduction in 28.12% of patients after bariatric and metabolic surgeries. Regarding hypoglycemic medication remission, the total remission was 70%, with a 25% partial reduction and 5% without reduction after the surgical procedures.

The medication remission in individuals diagnosed with grade I obesity who underwent metabolic surgery was as follows:

- For antihypertensive medications, there was a total remission in 75%, partial reduction in 12.5%, and no reduction in 12.5% of the individuals who underwent the procedure.

- For hypoglycemic medications, there was a total remission in 60%, partial reduction in 40%, and no patients experienced no reduction in medication use after surgery.
- In contrast, the medication remission in individuals diagnosed with grade II obesity who underwent bariatric surgery was as follows:
- For antihypertensive medications, there was a total remission in 60%, partial reduction in 16.67%, and no reduction in 33.33% of the individuals after surgery.
- For hypoglycemic medications, participants had a total remission rate of 76%, a partial reduction of 16%, and 8% had no reduction in use after the procedure.

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