

## Colorectal Anal Distress Inventory 8 (CRADI-8) Scores in PFDI-20 in Women with OASIS Before and After Repair

Rifqi Rahman Mulyana, Mochamad Rizkar Arev Sukarsa, Andi Rinaldi

Department of Obstetrics and Gynaecology, Faculty of Medicine, Universitas Padjadjaran

- Dr Hasan Sadikin Central General Hospital, Bandung, Indonesia

Corresponce: Rifqi Rahman Mulyana, Email: rifqi22007@mail.unpad.ac.id

### Abstract

**Objectives:** This research aims to assess and compare CRADI-8 scores in women with grade 3-4 OASIS before and after surgical repair.

**Methods:** This cross-sectional study analyzed 37 OASIS patients at Hasan Sadikin Hospital, Bandung (January 2021-December 2023). CRADI-8 scores were measured pre- and post-surgery, with scores categorized by grade (0-4). The McNemar test was used for statistical analysis ( $p < 0.05$ ).

**Results:** Pre-operatively, patients presented with high-grade scores: 27 (73.0%) with grade 3 and 10 (27.0%) with grade 4. Post-operatively, distribution improved: 1 patient (2.7%) to grade 0, 6 (16.2%) to grade 1, 15 (40.5%) to grade 2, 11 (29.7%) to grade 3, and 4 (10.8%) to grade 4. This improvement was statistically significant ( $p < 0.05$ ).

**Conclusion:** CRADI-8 scores significantly improved following surgical repair of OASIS, confirming the procedure effectively reduces anal distress severity and enhances colorectal function in affected women.

**Keywords:** OASIS, Colorectal Anal Distress Inventory 8, Pelvic Floor Distress Inventory Questionnaire-20

## Skor *Colorectal Anal Distress Inventory 8 (CRADI-8)* dalam PFDI-20 pada Perempuan dengan OASIS Sebelum dan Setelah Reparasi

### Abstrak

**Tujuan:** Untuk menilai dan membandingkan skor CRADI-8 pada perempuan dengan OASIS derajat 3-4 sebelum dan sesudah tindakan bedah perbaikan.

**Metode:** Studi potong lintang ini menganalisis 37 pasien OASIS di RSUP Hasan Sadikin, Bandung (Januari 2021–Desember 2023). Skor CRADI-8 diukur sebelum dan setelah operasi, dengan pengelompokan skor menurut derajat (0-4). Uji McNemar digunakan untuk analisis statistik ( $p < 0,05$ ).

**Hasil:** Sebelum operasi, pasien menunjukkan skor derajat tinggi: 27 pasien (73,0%) derajat 3 dan 10 pasien (27,0%) derajat 4. Setelah operasi, distribusi skor membaik: 1 pasien (2,7%) derajat 0, 6 pasien (16,2%) derajat 1, 15 pasien (40,5%) derajat 2, 11 pasien (29,7%) derajat 3, dan 4 pasien (10,8%) derajat 4. Perbaikan ini bermakna secara statistik ( $p < 0,05$ ).

**Kesimpulan:** Skor CRADI-8 menunjukkan perbaikan signifikan setelah tindakan bedah OASIS, prosedur ini efektif menurunkan tingkat keluhan anal dan meningkatkan fungsi kolorektal pada perempuan dengan OASIS.

**Kata kunci:** OASIS, Colorectal Anal Distress Inventory 8, Pelvic Floor Distress Inventory Questionnaire-20

## Introduction

The Pelvic Floor Distress Inventory (PFDI-20) is a comprehensive questionnaire designed to evaluate pelvic floor dysfunction in women. It comprises 20 questions, that are categorised into three distinct groups, each addressing various aspects of pelvic floor health.<sup>1,2</sup>

The PFDI-20 is divided into three distinct groups, each addressing different aspects of pelvic floor dysfunction. The first group is the Pelvic Organ Distress Inventory (POPDI-6), that includes six questions focusing on symptoms and discomfort associated by the pelvic organs. The second group, the Colorectal-Anal Distress Inventory (CRADI-8), comprises eight questions centred on issues related to colorectal and anal health. The third group, the Urinary Distress Inventory (UDI-6), contains six questions that explore concerns regarding urinary dysfunction.<sup>3,4</sup>

The colorectal-anal distress questionnaire (CRADI-8) group consists of 8 questions related to colorectal and anal disorders. The questions in this group highlight complaints such as difficulty emptying the colon completely, frequent feelings of incomplete bowel movements, and loss of control during defecation.<sup>5,6</sup>

CRADI 8 has a value of 0-100 as a scale to perform how much perceived impairment is associated with pelvic floor dysfunction. The interpretation is as follows: a response of 'no' results in a score of 0, revealing the absence of any impairment. In contrast, a 'yes' answer leads to a score ranging by 25 to 100, by higher values reflecting a more severe degree of impairment.<sup>5,6</sup>

Obstetrical Anal Sphincter Injuries (OASIS) are injuries to the anal sphincter muscle that occur during labour. It can occur when tissue in the perineal area is torn or severed during the birth of the baby. OASIS can have varying degrees of severity, ranging

by mild to more severe, and can impact a woman's quality of life after childbirth. Risk factors for OASIS include maternal characteristics, the birthing process, and baby characteristics.<sup>6</sup>

Despite the significant impact of OASIS on women's postpartum quality of life, there remains a critical gap in quantitative assessment of colorectal and anal function improvement following surgical repair. While OASIS can lead to substantial morbidity including fecal incontinence, pain during defecation, and urgency, the effectiveness of surgical interventions in alleviating these specific symptoms has not been adequately measured using validated instruments. This research addresses this gap by utilizing the CRADI-8 component of PFDI-20 to objectively quantify the changes in colorectal and anal distress before and after surgical repair, providing essential data to guide clinical decision-making and improve postpartum care for women affected by OASIS.

In this research, Colorectal Anal Distress Inventory 8 (CRADI-8) scores in PFDI-20 will be compared in women by Obstetrical Anal Sphincter Injuries (OASIS) before and after repair. The PFDI-20 is an instrument used to evaluate pelvic dysfunction in women, while the CRADI-8 is used to perform distress related to anal and rectal disorders. This research will provide new insights into changes in CRADI-8 scores inside of the PFDI-20 in women who experience OASIS and undergo repair procedures. The outcomes of this research are anticipated to take up valuable insights into the management of patients by OASIS, while also serving as a guide for performing anal and rectal distress following surgical repair of OASIS.<sup>6,7</sup>

## Methods

This research was conducted utilizing a cross-sectional design, involving the review

of secondary data by patients by OASIS treated at the Department of Obstetrics and Gynaecology, Hasan Sadikin General Hospital in Bandung, from January 2021 to December 2023. The inclusion criteria for this research encompassed women with grade III or IV OASIS and had been referred to RSHS during the specified timeframe. Conversely, the exclusion criteria were based on the presence of incomplete patients data, as well as pregnant women who either gave birth without OASIS at RSHS during the same period, or those who delivered by grade I or II OASIS and were referred to the hospital inside of the designated timeframe.

The minimum sample size is calculated utilizing the Estimating a Population Proportion by Specified Absolute Precision formula. Based on this formula, the sample size in this research obtained a amount sample size of 37 people.

The characteristics of the patients were reported as mean and standard deviation for normally distributed numerical data, while categorical variables were expressed as percentages. The patients characteristics performed in this research included age, parity status, previous pregnancy history, and the type of repair performed. Maternal outcomes were evaluated based on CRADI-8 scoring.

1. Do you experience the sensation of needing to strain excessively in order to pass a bowel movement?
2. Do you feel that your bowels are not fully emptied by the end of a bowel movement?
3. Do you have the sensation that your bowel movements are difficult to control?
4. Do you feel that your bowel movements are uncontrollable, particularly when your faeces are loose or liquid?
5. Do you feel that the passing of gas is beyond your control?

6. Do you frequently experience pain during bowel movements?
7. Do you often feel a strong, urgent need to defecate, prompting you to rush to the bathroom?

Nominal data for comparison will be analysed using the McNemar test, by a significance threshold set at 0.05. The data analysis was conducted utilizing IBM SPSS software, version 25.0.

## Results

The data collection process identified 91 patients diagnosed by OASIS during the period by January 2021 to December 2023. Of these, 37 patients who met the specified inclusion and exclusion criteria were ultimately included in the research.

The subjects by OASIS grades III and IV had a mean age of 30 years, by a standard deviation of 2.79 years. The average Body Mass Index (BMI) among the participants was 25.9 kg/m<sup>2</sup>, by a standard deviation of 1.26 kg/m<sup>2</sup>. Regarding educational attainment, the majority of the subjects, amounting 20 individuals (54.05%), had completed only elementary or junior high school education. While the rest, 17 people or 45.95%, had high school or college education. In terms of gravida or number of pregnancies status, 23 people or 62.16% of the subjects had two or fewer pregnancies, while 14 people or 37.84% had three or more pregnancies. For parity or number of deliveries, 26 people or 70.27% of subjects had two or fewer children, while 11 people or 29.73% had three or more children. In terms of occupation, most of the subjects were housewives, namely 20 people or 54.05%, and the rest, 17 people or 45.95%, were workers. In terms of income, 10 people or 27.03% of the subjects had insufficient income, 17 people or 45.95% had sufficient income, and 10 people or 27.03% had very sufficient income. Finally, in terms of family

**Table 1 Characteristics of subjects by OASIS grade III and IV**

<b>Variables</b>	<b>Mean</b>	<b>SD</b>
Age (years)	30.0	2.79
BMI (kg/m <sup>2</sup> )	25.9	1.26
	amount	Percent
<b>Education</b>		
Primary School, Junior High School	20.0	54.05%
Senior High School, College	17.0	45.95%
<b>Gravida</b>		
Two or less	23.0	62.16%
Three or more	14.0	37.84%
<b>Parity</b>		
Two or less	26.0	70.27%
Three or more	11.0	29.73%
<b>Jobs</b>		
Housewife	20.0	54.05%
Workers	17.0	45.95%
<b>Salary</b>		
Not enough	10.0	27.03%
Simply	17.0	45.95%
Very sufficient	10.0	27.03%
<b>Family history of OASIS</b>		
Yes	14.0	37.84%
No	23.0	62.16%

**Table 2 Distribution of Patients by CRADI-8 Severity Grades Before and After Surgical Repair**

<b>CRADI-8 Grade</b>	<b>Before Repair n(%)</b>	<b>After Repair n(%)</b>	<b>p-value</b>
Grade 0	0	1	<0,05
Grade 1	0	6	
Grade 2	0	15	
Grade 3	27	11	
Grade 4	10	4	

This analysis utilised the McNemar test, that is appropriate for paired nominal data to determine the significance of changes in paired proportions.

history, 14 people or 37.84% of subjects had a family history of OASIS, while 23 people or 62.16% did not have such a history.

Table 2 demonstrates a significant shift in CRADI-8 severity grades among patients following surgical repair, with a p-value of  $<0.05$  as determined by the McNemar test for paired nominal data. Prior to surgical intervention, patients were concentrated exclusively in the higher severity categories, with 27 patients (73%) presenting with grade 3 severity and 10 patients (27%) with grade 4 severity. Post-surgical outcomes reveal a marked improvement in severity distribution, with patients now spread across all five severity grades and notably shifting toward lower severity classifications. After repair, only 15 patients remained in the higher severity categories (11 with grade 3 and 4 with grade 4), while 22 patients improved to grade 2 or better (15 patients with grade 2, 6 with grade 1, and 1 with grade 0), indicating the surgical procedure effectively reduced symptom severity in the majority of cases.

## Discussion

This research revealed that subjects by grade III and IV OASIS had a mean age of 30 years, by a standard deviation of 2.79 years. This result aligns by the outcomes of a previous research by Sartore et al., that reported an average age of  $32.8 \pm 5.1$  years for patients by grade III and IV OASIS.<sup>8</sup> During pregnancy and childbirth, the female body undergoes significant physiological and hormonal changes. These changes can weaken the pelvic floor muscles and other supporting structures, making them more susceptible to injury and impaired pelvic floor function. By the age of 30, many women will have experienced their first or second labour. Each childbirth can exert significant pressure and cause trauma to the pelvic floor muscles and tissues, thereby increasing the likelihood of perineal tears and other pelvic

floor complications. Furthermore, research indicates that women giving birth in their 30s are more likely to have higher birth weights and to undergo assisted delivery methods, such as the use of forceps or a vacuum, that are associated by an elevated risk of more severe perineal tears. As we age, the elasticity of the body's tissues, including the pelvic floor tissues, tends to decrease, making the tissues more susceptible to tears and injuries during labour. In their 30s, many women also experience changes in their physical activity levels and general health, that can affect the strength and endurance of the pelvic floor muscles.<sup>9</sup>

In this research, the mean Body Mass Index (BMI) of the subjects was found to be  $25.9 \text{ kg/m}^2$ , by a standard deviation of  $1.26 \text{ kg/m}^2$ . This outcome is consistent by the results of a previous research by Sartore et al., that reported a mean BMI of  $24.8 \pm 4.1 \text{ kg/m}^2$  in patients by OASIS grades III and IV.<sup>8</sup> Higher BMI is associated by increased intra-abdominal pressure that puts additional stress on the muscles and supporting structures of the pelvic floor, thus increasing the likelihood of injury or impaired function. Secondly, individuals by a higher BMI may have lower tissue elasticity, that makes the pelvic floor tissues more susceptible to injury during labour or strenuous physical activity. In addition, a higher BMI is often associated by various health conditions that can affect pelvic floor function, such as diabetes and hypertension, that can affect blood circulation and tissue health, as well as pelvic floor muscle strength and endurance.<sup>9</sup>

Regarding educational attainment, the majority of the research participants, comprising 20 individuals or 54.05%, had completed only elementary or junior high school education. In contrast, the remaining 17 individuals, accounting for 45.95%, had received either a high school or college education. This outcome is in accordance by the results in a previous research conducted

by Mashayekh where the research found that pelvic floor abnormalities were more often found in patients by lower education 71.5% compared to patients who had higher education 28.5%. Women by higher education levels had a better understanding of the symptoms of OASIS and were more likely to seek medical care compared to those by lower education levels. This suggests that education may have a role in increasing awareness of the importance of pelvic health. In addition, higher education levels are often associated by better adherence to treatment plans recommended by healthcare providers. This means that more educated women are more likely to follow medical instructions precisely, that contributes to better treatment outcomes. Openness to discussing health issues is also more prevalent among women by higher education. They are more likely to discuss their health concerns, including pelvic floor dysfunction, that allows for early diagnosis and more effective management. Socially and psychologically, higher education may influence women's perception of OASIS symptoms, where they are more likely to seek help. They may not feel embarrassed or fear the stigma often associated by this disorder. Thus, higher education not only increases awareness and knowledge, but also influences attitudes and actions related to pelvic floor health.<sup>10</sup>

In terms of gravida status, 23 people or 62.16% of subjects had two or fewer pregnancies, while 14 people or 37.84% had three or more pregnancies. For parity, 26 people or 70.27% of subjects had two or fewer children, while 11 people or 29.73% had three or more children. The previous research found that 299 participants (74.8%) had a gravidity of two or less, while 101 participants (25.3%) had a gravidity of three or more. In terms of parity, 352 participants (88.0%) had a parity of two or less, and only 48 participants (12.0%) had a parity of three or more. Pregnancy and number of births

(gravida status and parity) have a significant influence on pelvic floor dysfunction. During pregnancy, significant physiological and hormonal changes occur that affect the pelvic floor. An increase in fetal weight places additional strain on the pelvic muscles, ligaments, and connective tissues, potentially weakening these structures and contributing to pelvic floor dysfunction. Studies have shown that pregnancy, particularly during the third trimester, is a significant risk factor for the onset of pelvic floor disorders, including urinary incontinence and pelvic organ prolapse. Moreover, the risk of developing pelvic floor dysfunction escalates by the number of pregnancies a woman experiences, as each childbirth imposes further pressure and stress on the pelvic muscles and tissues, that may result in weakness or even permanent damage.<sup>8-10</sup>

In terms of occupation, most of the subjects were housewives, namely 20 people or 54.05%, and the rest, 17 people or 45.95%, were workers. Previous research found that out of 400 research subjects 82.3% were housewives while the rest were workers by a presentation of 17.8%. This shows that pelvic floor dysfunction is more common in housewives than workers. This could be due to factors such as different physical activities and domestic roles that affect the physical condition and health of the pelvic floor in women.<sup>9</sup>

In terms of income, in this research 10 people or 27.03% of subjects had insufficient income, 17 people or 45.95% had sufficient income, and 10 people or 27.03% had very sufficient income. In previous studies, salaries were divided into 3 groups by the results of the research being insufficient (18.5%), sufficient (57.0%), and very sufficient (24.5%). Women by insufficient income tend to have a higher prevalence of pelvic dysfunction compared to those by sufficient or very sufficient income. This is due to more limited access to health facilities and information on prevention and

management of pelvic dysfunction, as well as financial stress that can affect general health and pelvic floor function.<sup>2,3-7</sup>

In this research it was found that 37% of patients by OASIS had a family history of OASIS, family history increases an individual's risk of developing a similar condition due to inherited genetic factors. Genetics can affect the strength and elasticity of the muscles and connective tissues in the pelvic region, that can lead to weakness and dysfunction in the area. Therefore, women by a positive family history for PFD tend to have a higher risk of developing this condition compared to those devoid of a family history.<sup>9</sup>

The outcomes of this research revealed that, following surgical repair in patients diagnosed by CRADI 8, there was a notable reduction in the severity of anal distress. This was evidenced by a decrease in the number of patients classified inside of degrees 3 and 4, alongside an increase in those inside of degrees 0, 1, and 2. The observed changes were statistically significant, by a p-value of <0.05. OASIS injury, a serious complication, remains a potential risk during vaginal delivery. It involves the complex anal sphincter, and in more severe cases, the anal mucosa. Research shows that OASIS can lead to anal incontinence, that has a significant impact on the quality of life of women who experience it. A systematic research conducted by Fernando et al showed that primary repair (acute repair) performed immediately after injury has better results than secondary repair performed after several months. Proper primary repair can reduce the risk of anal dysfunction in the future. The success of OASIS repair is influenced by several factors, including the extent of the damage, the repair technique used and surgical expertise. As such, timely and technically correct surgical repair can significantly reduce the long-term impact of OASIS, improve patients quality of life, and reduce the ratio of anal incontinence resulting by this injury.<sup>11</sup>

The analysis of CRADI-8 scores revealed substantial improvements following surgical repair of OASIS.<sup>12,13</sup> Pre-operatively, all patients presented with high-grade scores (73.0% with grade 3 and 27.0% with grade 4), indicating severe colorectal and anal distress. Post-operatively, there was a statistically significant redistribution toward lower severity grades, with 59.4% of patients improving to grade 2 or better. This reduction in CRADI-8 scores demonstrates the effectiveness of surgical intervention in alleviating colorectal and anal symptoms associated with OASIS, which aligns with findings from Fernando et al. who reported improved functional outcomes following proper primary repair of anal sphincter injuries.<sup>11</sup>

The marked improvement in CRADI-8 scores translates to meaningful clinical benefits for patients.<sup>14</sup> The reduction in symptom severity from predominantly grades 3-4 (100% pre-operatively) to a broader distribution across all five grades (with only 40.5% remaining in grades 3-4 post-operatively) suggests that surgical repair effectively addresses functional impairments that impact daily life.<sup>15</sup> This quantitative improvement supports the value of timely surgical intervention for women with OASIS as a means to reduce anal distress and improve quality of life.

This research has several limitations that may affect its results and conclusions. The small sample size, involving only 37 subjects, may limit the generalisation of the research results to a wider population. In addition, this research used retrospective data by medical records, that may have shortcomings such as incomplete data or recording errors. Variability in the OASIS repair techniques used and differences in surgical expertise may also affect the research results. Furthermore, this research did not consider other factors that may affect the results, such as the general health condition of the subjects and the initial

severity of the injury.

## Conclusions

The research conducted at Hasan Sadikin Hospital in Bandung demonstrated that surgical repair procedures led to a significant reduction in the severity of anal distress among patients by Obstetric Anal Sphincter Injuries (OASIS). These outcomes not only underscore the effectiveness of the surgical intervention but also highlight its positive impact on enhancing the quality of life for individuals affected by OASIS.

## References

1. de Arruda GT, dos Santos HT, Virtuoso JF. Pelvic floor distress inventory (PFDI)-systematic review of measurement properties. *Int Urogynecol J*. 2021;32(10):2657-69
2. Utomo E, Blok BF, Steensma AB, Korfage IJ. Validation of the Pelvic Floor Distress Inventory (PFDI-20) and Pelvic Floor Impact Questionnaire (PFIQ-7) in a Dutch population. *Int Urogynecol J*. 2014;25(4):531-44.
3. Teleman PIA, Stenzelius K, Iorizzo L, Jakobsson ULF. Validation of the Swedish short forms of the Pelvic Floor Impact Questionnaire (PFIQ-7), Pelvic Floor Distress Inventory (PFDI-20) and Pelvic Organ Prolapse/Urinary Incontinence Sexual Questionnaire (PISQ-12). *Acta Obstet Gynaecol Scand*. 2011;90(5):483-7
4. Lemack GE, Zimmern PE. Predictability of urodynamic findings based on the Urogenital Distress Inventory-6 questionnaire. *Urology*. 1999;54(3):461-466. doi:10.1016/s0090-4295(99)00246-0
5. Scheer I, Thakar R, Sultan AH. Mode of delivery after previous obstetric anal sphincter injuries (OASIS)-a reappraisal? *Int Urogynecol J* 2009;20:1095-101
6. McPherson KC, Beggs AD, Sultan AH, Thakar R. Can the risk of obstetric anal sphincter injuries (OASIS) be predicted utilizing a risk-scoring system? *BMC Res Notes* 2014;7:471
7. Roos AM, Thakar R, Sultan AH. Outcome of primary repair of obstetric anal sphincter injuries (OASIS): does the grade of tear matter? *Ultrasound Obstet Gynaecol* 2010;36:368-74.
8. Sartore A, Scalia MS, Mangino FP, Savastano G, Magni E, Ricci G. Pelvic floor function after third and fourth degree perineal lacerations: a case-control research on quality of life. *BMC Womens Health*. 2024;24(1):12. Published 2024 Jan 3. doi:10.1186/s12905-023-02739-9
9. Mashayekh-Amiri S, Asghari Jafarabadi M, Rashidi F, Mirghafourvand M. Translation and measurement properties of the pelvic floor distress inventory-short form (PFDI-20) in Iranian reproductive age women. *BMC Womens Health*. 2023;23(1):333. Published 2023 Jun 24. doi:10.1186/s12905-023-02493-y
10. Brennen R, Lin KY, Denehy L, Frawley HC. The Effect of Pelvic Floor Muscle Interventions on Pelvic Floor Dysfunction After Gynaecological Cancer Treatment: A Systematic Review. *Phys Ther*. 2020;100(8):1357-1371. doi:10.1093/ptj/pzaa081
11. Fernando RJ, Sultan AH, Radley S, Jones PW, Johanson RB. Management of obstetric anal sphincter injury: a systematic review & national practice survey. *BMC Health Serv Res*. 2002;2(1):9. Published 2002 May 13. doi:10.1186/1472-6963-2-9
12. Şimsek A, Ateş M, Dirican A, Özgör D. A surgical technique for secondary repair of obstetric anal sphincter injuries; sphinctero-vagino-perineoplasty. *Turk J Obstet Gynecol*. 2018;15(4):249-253. doi:10.4274/tjod.12369

13. Weledji EP, Elong A, Verla V. Secondary repair of severe chronic fourth-degree perineal tear due to obstetric trauma. *J Surg Case Rep.* 2014;2014(5):rju034. Published 2014 May 13. doi:10.1093/jscr/rju034
14. Ramage L, Yen C, Qiu S, et al. Functional and quality of life outcomes following obstetric anal sphincter injury (OASI): does the grade of injury affect outcomes?. *Int Urogynecol J.* 2017;28(11):1709-1717. doi:10.1007/s00192-017-3334-3
15. Bharucha AE, Seide BM, Zinsmeister AR, Melton LJ 3rd. Relation of bowel habits to fecal incontinence in women. *Am J Gastroenterol.* 2008 May;103(5):1470-5. doi: 10.1111/j.1572-0241.2008.01922.x. PMID: 18510606