

# Comparative Study to Evaluate Intersystem Association between Pelvic Organ Prolapse Quantification System and Simplified Pelvic Organ Prolapse Scoring System

Vaidehi A Duddalwar<sup>1</sup>, Anuja Bhalerao<sup>2</sup>

## ABSTRACT

**Aim:** To study the intersystem association between pelvic organ prolapse quantification (POP-Q) system and simplified pelvic organ prolapse (S-POP) scoring system.

**Materials and methods:** This hospital-based prospective, randomized controlled trial was conducted in 65 women of reproductive, perimenopausal, and postmenopausal age-group with pelvic organ prolapse having urinary or bowel complaints and admitted to gynecology ward of Lata Mangeshkar Hospital, Nagpur, during the period from October 1, 2016, to October 31, 2018. Women willing to participate in the study were assessed and enrolled in the study after fulfilling inclusion and exclusion criteria. Women were assessed by both the assessment systems—POP-Q system and S-POP scoring system preoperatively for evaluating intersystem association between them.

**Results:** There was FAIR association between POP-Q and S-POP of stage II and stage III for anterior wall prolapse. The association was GOOD of stage II and FAIR of stage III for central compartment and VERY GOOD of stage II and FAIR of stage III for overall prolapse.

**Conclusion:** Though POP-Q system appears complex; it is simple and has a learning curve. With respect to pelvic floor repair and significant anatomical and functional improvement postoperatively, POP-Q system should be the preferred method of assessment of pelvic organ prolapse.

**Clinical significance:** We hope to find a suitable, reproducible, standardized, and user-friendly method for quantification of pelvic organ prolapse to relate the result of the test to the outcome of treatment.

**Keywords:** Intersystem association, Pelvic organ prolapse quantification system, Simplified pelvic organ prolapse scoring system.

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## INTRODUCTION

Pelvic organ prolapse is a common distressing and disabling condition occurring due to weakness in the supporting structures of pelvic floor, thereby allowing the pelvic viscera to descend and herniate through the vaginal orifice in late stages.<sup>1</sup> It is often associated with deterioration in quality of life and may contribute to bladder, bowel, and sexual dysfunction. Extended life expectancy together with expanding elderly population and motherhood has resulted in prolapse becoming an increasingly prevalent condition.

Uterovaginal prolapse is a common condition affecting 30% of women, and around 50% of these women are over 50 years of age.<sup>2,3</sup> Pelvic organ prolapse has become a major indication for hysterectomy. The lifetime risk for undergoing surgery for pelvic organ prolapse has been estimated to be 11%.<sup>4,5</sup>

Pelvic organ prolapse has remained an issue of major health concern affecting a large cohort of women in both industrialized and developing countries. Though pelvic organ prolapse is more common in older women, it is now seen with an increasing frequency even in the reproductive age-group. Current research has now been directed toward exploring the possibility of a genetic basis (reduced collagen content) for women with inherently weak ligaments and fascial supports.<sup>6–8</sup>

Evaluating pelvic floor anatomy and pelvic organ prolapse has been at the foremost of gynecological evaluation since the inception of speciality. Various attempts at classifying pelvic organ prolapse were made as early as late 19th century. The lack of standard, imprecise, and reproducible terminology in pelvic

<sup>1–2</sup>Department of Obstetrics and Gynaecology, NKP Salve Institute of Medical Sciences and Research and Lata Mangeshkar Hospital, Nagpur, Maharashtra, India

**Corresponding Author:** Vaidehi A Duddalwar, Department of Obstetrics and Gynaecology, NKP Salve Institute of Medical Sciences and Research and Lata Mangeshkar Hospital, Nagpur, Maharashtra, India, Phone: +91 9860487819, e-mail: vaidehiduddalwar@gmail.com

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floor disorders is a major obstacle in performing and interpreting research.<sup>9</sup> The commonly used methods of classifying and grading prolapse are qualitative and subjective with high interobserver and intraobserver variations.<sup>10</sup> This absence of standardization prevents decisive comparison of the published series, surgical results, effective communications among clinicians, and longitudinal comparison in an individual case.

In view of need for an accepted, objective, and validated system for describing pelvic organ prolapse, the International Continence Society (ICS) has adopted the POP-Q system in 1996 introduced by Dr. Richard Bump and further approved by the American Urogynecologic Society (AUGS), Society of Gynecologic Surgeons (SGS), and recently by National Institute of Health (NIH).<sup>11,12</sup>

POP-Q system describes the topographic position of six vaginal sites<sup>13</sup> and determines the perineal descent and the change in axis of the levator plate based upon increase in genital hiatus and perineal body measurements. It creates a better vaginal profile and was shown to have considerable intra- and interobserver reliability.

Meta-analytical research today shows that POP-Q is being used by only 3% of investigators. There is paucity of guidelines and studies with immense variabilities for use of a particular classification system for the assessment of pelvic organ prolapse.

Therefore, this study was undertaken to evaluate intersystem association between POP-Q system and S-POP scoring system for the assessment of women with pelvic organ prolapse.

## MATERIALS AND METHODS

This hospital-based prospective, comparative, randomized controlled trial was carried out in 65 women of reproductive, perimenopausal, and postmenopausal age-group admitted to gynecology ward (Department of Obstetrics and Gynecology) of Lata Mangeshkar Hospital, NKPSIMS, Nagpur, over a period of 2 years from October 1, 2016, to October 31, 2018, after proper and adequate authorization from Institutional Ethics Committee.

Women with pelvic organ prolapse having urinary and bowel symptoms requiring surgery and willing to participate in the study were assessed and enrolled in the study as per the formulated inclusion and exclusion criteria.

The inclusion criteria included women with pelvic organ prolapse and associated genitourinary symptoms willing for surgical management. Women unfit for surgery or those willing for conservative management were excluded from the study.

### Evaluation

All women included in the study were first informed about the study. A proper written and informed consent was taken from every woman. The demographics of each woman were recorded, followed by detailed history. Thorough general examination and spine examination were done to rule out any spinal cord deformities and gait disturbances. Systemic examination, local examination, and pelvic examination were done in dorsal position for assessing grade of prolapse.

The entire selected cohort was then subjected to both the assessment systems (POP-Q and S-POP) by independent investigators, and findings were recorded. The investigators for both POP-Q system and S-POP scoring system included one senior assisted by a junior resident, and each group was blinded to the results of other groups to prevent bias.

For S-POP scoring system evaluation, women were asked to strain and the point of maximum protrusion was noted. Four areas were examined including the anterior and posterior vaginal walls, the apex, and the cervix. Pelvic organ prolapse is then graded according to the S-POP (Table 1), followed by staging of vaginal wall prolapse (Table 2).

For POP-Q system evaluation, the woman was asked to strain or cough and the point of maximum protrusion was noted. Marked Ayres spatula was used for the measurement and grid with three columns and rows was drawn and labeled with respective women's names. The first measurement was done of the genital hiatus (Gh), perineal body (Pb), and total vaginal length (tvL) when the prolapse was reduced and without straining using a marked Ayres spatula and the measurements were entered in the grid. Points C and

D were next measured during maximum straining, followed by points Aa and Ba on anterior vaginal wall and points Ap and Bp on the posterior vaginal wall—also with maximum straining. All the measured points were then entered in the 3 × 3 grid, and further, the grading of prolapse was decided by the leading edge of prolapse (Fig. 1 and Table 3).

All the data was recorded on a case record form. The intersystem association between POP-Q and S-POP for the assessment of pelvic organ prolapse was determined using kappa statistics.

## RESULTS

The present study was undertaken to compare and evaluate intersystem association between POP-Q system and S-POP scoring system. Sixty-five women with pelvic organ prolapse having urinary and bowel symptoms requiring surgery were incorporated in the study and were followed up till the seventh postoperative day.

Fourteen women (21.54%) with pelvic organ prolapse belonged to age-group of 46–50 years. Mean age of women was  $50.1231 \pm 10.4216$  years. Forty-four women (67.69%) had parity from 2 to 4, and the overall mean parity was  $2.6615 \pm 1.6229$ . Thirty-nine women (60%) incorporated in the study were postmenopausal.

Thirty-seven women (56.92%) had obstetric causes. Only five women (7.69%) had family history of pelvic organ prolapse. Other predisposing factors for pelvic organ prolapse were as follows: occupation—24 (36.92%), chronic cough—23 (35.38%), chronic constipation—19 (29.23%), and obesity—18 (27.69%).

Sixty-five women (100%) had symptom of mass coming out per vaginam, while 53 women (81.54%) had urinary symptoms, and 30 women (46.15%) had bowel symptoms. Forty-seven women (72.30%) with pelvic organ prolapse had level I and level II defects as per DeLancey's classification. Twelve women (18.46%) had level I, level II, and level III defects.

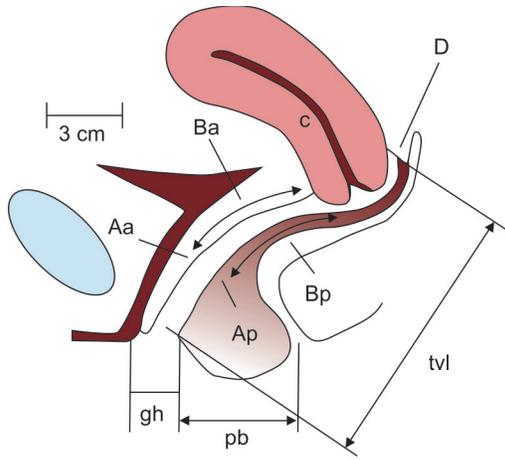
For compartment-wise comparison, prolapse only in a single compartment was considered, assuming the rest of the compartments to be having no prolapse. Thereafter, the grading of prolapse was done by POP-Q system and S-POP scoring system.

**Table 1:** Grading of pelvic organ prolapse according to simplified pelvic organ prolapse (S-POP) scoring system

| <i>Degree of prolapse</i> | <i>Extent of prolapse (in relation to the hymen)</i> |
|---------------------------|--|
| No prolapse               | Normal position for each site                        |
| First-degree prolapse     | Descent halfway to the hymen                         |
| Second-degree prolapse    | Descent to the hymen                                 |
| Third-degree prolapse     | Descent halfway beyond the hymen                     |
| Procidentia               | Maximum possible descent for each site               |

**Table 2:** Classification of vaginal wall prolapse

| <i>Vaginal wall prolapse</i>          |  |
|---------------------------------------|--|
| <i>Anterior vaginal wall prolapse</i> | <i>Posterior vaginal wall prolapse</i> |
| Upper 2/3—cystocele                   | Upper 1/3—enterocele                   |
| Lower 1/3—urethrocele                 | Middle 1/3—rectocele                   |
|                                       | Lower 1/3—deficient perineum           |



|                      |                      |                             |
|----------------------|----------------------|-----------------------------|
| Anterior wall<br>Aa  | Anterior wall<br>Ba  | Cervix or cuff<br>C         |
| Genital hiatus<br>gh | Perineal body<br>pb  | Total vaginal length<br>tvL |
| Posterior wall<br>Ap | Posterior wall<br>Bp | Posterior fornix<br>D       |

Fig. 1: Pelvic organ prolapse quantification system—measurements of the POP-Q parameters and their representation

Table 3: Staging of pelvic organ prolapse according to pelvic organ prolapse quantification (POP-Q) system

| Stage of prolapse | Extent of prolapse (in relationship to the hymen: prolapse above the hymen, negative numbers; prolapse beyond the hymen, positive numbers) |
|-------------------|--|
| Stage 0           | No prolapse (apex can descend as far as 2 cm relative to the total vaginal length)   |
| Stage I           | The most distal portion of prolapse descends to a point less more than 1 cm above the hymen  |
| Stage II          | Maximum descent is within 1 cm of the hymen  |
| Stage III         | Prolapse extends more than 1 cm beyond the hymen but no more than 2 cm of the total vaginal length   |
| Stage IV          | Complete eversion of the vagina or descent within 2 cm of the total vaginal length   |

Table 4: Interpretation of kappa provided on page 404 of Altman DG

| Value of K     | Strength of association |
|----------------|-------------------------|
| Less than 0.20 | POOR association        |
| 0.20–0.40      | FAIR association        |
| 0.40–0.60      | MODERATE association    |
| 0.60–0.80      | GOOD association        |
| 0.80–1.00      | VERY GOOD association   |

Practical Statistics for Medical Research (1991). London, England: Chapman and Hall

Table 5: Intersystem association between POP-Q and S-POP for anterior vaginal wall prolapse

| S-POP | STAGE | POP-Q |    |     |    |
|-------|-------|-------|----|-----|----|
|       |       | I     | II | III | IV |
|       | I     | 0     |    |     |    |
|       | II    |       | 5  |     |    |
|       | III   |       |    | 38  |    |
|       | IV    |       |    |     | 1  |

Table 6: Intersystem association between POP-Q and S-POP for posterior vaginal wall prolapse

| S-POP | STAGE | POP-Q |    |     |    |
|-------|-------|-------|----|-----|----|
|       |       | I     | II | III | IV |
|       | I     | 0     |    |     |    |
|       | II    |       | 6  |     |    |
|       | III   |       |    | 20  |    |
|       | IV    |       |    |     | 0  |

For intersystem association, kappa statistics was applied. K is always less than or equal to 1. A value of 1 implies perfect association, and values less than 1 imply less than perfect association. In rare situations, kappa can be negative. Below is one possible interpretation of kappa, which is provided on page 404 of Altman DG. Practical Statistics for Medical Research (1991) London England: Chapman and Hall (Table 4).

**Intersystem Association between POP-Q and S-POP for Anterior Vaginal Wall Prolapse (Table 5)**

Stage I kappa—0 (POOR association)  
 Stage II kappa—0.3352 (FAIR association)  
 Stage III kappa—0.2121 (FAIR association)  
 Stage IV kappa—0.1123 (POOR association)  
 Number of observed agreements: 44 (78.57% of the observations)  
 Mean kappa: 0.1649

The above table shows that there was FAIR association between POP-Q system and S-POP scoring system staging of stage II and stage III for anterior wall prolapse. The strength of agreement was 78.57%.

**Intersystem Association between POP-Q and S-POP for Posterior Vaginal Wall Prolapse (Table 6)**

Stage I kappa—0 (POOR association)  
 Stage II kappa—0.1205 (POOR association)  
 Stage III kappa—0.0626 (POOR association)  
 Stage IV kappa—0 (POOR association)  
 Number of observed agreements: 26 (61.90% of the observations)  
 Mean kappa: 0.045775

The above table shows that, though all the stages of posterior wall prolapse had POOR association, 61.90% of women had agreement between POP-Q system and S-POP scoring system.

### Intersystem Association between POP-Q and S-POP for Central Compartment Prolapse (Table 7)

Stage I kappa—0 (POOR association)  
 Stage II kappa—0.7441 (GOOD association)  
 Stage III kappa—0.2374 (FAIR association)  
 Stage IV kappa—0.1344 (POOR association)  
 Number of observed agreements: 40 (71.43% of the observations)  
 Mean kappa: 0.278975

The strength of association is considered to be "FAIR."

The above table shows that there was GOOD association of stage II and FAIR association of stage III between POP-Q system and S-POP scoring system for central compartment. The strength of agreement was 71.43%.

### Intersystem Association between POP-Q and S-POP for Overall Prolapse (Table 8)

Stage I kappa—0 (POOR association)  
 Stage II kappa—1 (VERY GOOD association)  
 Stage III kappa—0.2921 (FAIR association)  
 Stage IV kappa—0.1216 (POOR association)  
 Number of observed agreements: 43 (66.15% of the observations)  
 Mean kappa: 0.353425

The strength of association is considered to be "FAIR."

The above table shows that there was VERY GOOD association of stage II and FAIR association of stage III between POP-Q system and S-POP scoring system for overall prolapse. The strength of agreement was 66.15%.

## DISCUSSION

Pelvic organ prolapse is the descent of pelvic organs beyond their anatomical confines, which has remained an issue of major health concern affecting a large cohort of women in both developed and developing countries. Evaluating pelvic floor anatomy and pelvic organ prolapse has been at the foremost of gynecological evaluation since the inception of specialty. Various attempts at classifying pelvic organ prolapse were made as early as late 19th century. The lack of standard, imprecise, and reproducible terminology in pelvic floor disorders is a major obstacle in performing and interpreting research.

Age-group of women included in our study was 31–75 years. Maximum number of women belonged to the age-group of 46–50 years. The mean age of women included in our study was  $50.123 \pm 10.421$  years. The age of women incorporated in studies conducted by Yuvaraj et al.<sup>2</sup> and Singh et al.<sup>16</sup> was the same as ours—51–70 and 54 years, respectively. In the rest of the studies, the mean age was as follows: First study of Dhama V et al.<sup>14</sup>— $48 \pm 12$  years, second study of Dhama et al.<sup>1</sup>—46–50 years, Raizada et al.<sup>13</sup>— $60 \pm 10$  years, Manonai et al.<sup>15</sup>— $56 \pm 13$  years, and Narathorn et al.<sup>17</sup>— $58.1 \pm 12.7$  years.

In the present study, majority of women 44 (67.69%) had parity of 2–4. Mean parity in our study was  $2.66 \pm 1.62$ . Other studies—Yuvaraj et al.,<sup>2</sup> Manonai et al.,<sup>15</sup> and Singh et al.<sup>16</sup>—had the same mean parity as ours, while it was slightly higher in studies conducted by Dhama et al.<sup>1,14</sup> Thirty-nine women (60%) were postmenopausal, and the rest 26 women (40%) were premenopausal. The study conducted by Singh et al.<sup>16</sup> had similar proportion of postmenopausal women as in our study, while it was slightly less (58%) in a study conducted by Yuvraj et al.<sup>2</sup>

**Table 7:** Intersystem association between POP-Q and S-POP for central compartment prolapse

|       |     | POP-Q   |    |     |    |
|-------|-----|---------|----|-----|----|
|       |     | STAGE I | II | III | IV |
| S-POP | I   | 0       |    |     |    |
|       | II  |         | 7  |     |    |
|       | III |         |    | 29  |    |
|       | IV  |         |    |     | 4  |

**Table 8:** Intersystem association between POP-Q and S-POP for overall prolapse

|       |     | POP-Q   |    |     |    |
|-------|-----|---------|----|-----|----|
|       |     | STAGE I | II | III | IV |
| S-POP | I   | 0       |    |     |    |
|       | II  |         | 7  |     |    |
|       | III |         |    | 32  |    |
|       | IV  |         |    |     | 4  |

In the current study, 37 of 65 women (56.92%) presenting with symptoms of mass coming out per vaginam had obstetric causes as the leading predisposing factor. Five women (7.69%) had associated family history of pelvic organ prolapse. Affection due to other predisposing factors was as follows: occupation—24 (36.92%), chronic cough—23 (35.38%), chronic constipation—19 (29.23%), and obesity—18 (27.69%). Mention about the predisposing factors for pelvic organ prolapse has been made in the study of Yuvaraj et al.<sup>2</sup> where advancing age with faulty methods of conducting labor and lack of puerperal rehabilitation were noted as the most important predisposing factors.

In our study, other than symptom of mass coming out per vaginam in 100% women, 81.54% women had urinary symptoms and 53.85% had bowel symptoms. The study of Yuvaraj et al.<sup>2</sup> also had symptom of mass coming out per vaginam in 100% women, urinary symptoms in 74% and bowel symptoms in 34% women. Proportion of women with symptom of mass coming out per vaginam was less in other studies like second study of Dhama et al.<sup>1</sup> and Singh et al.<sup>16</sup> The level of pelvic organ prolapse (pertaining to DeLancey's level of supports of uterus) has been studied, and we found that maximum number of women among the study cohort 47 women (72.30%) had level I and level II prolapse (due to defect in the level I and level II supports). Six (9.23%) women had only level I prolapse and 12 of 65 (18.46%) women had prolapse at all the three levels. No other studies have mentioned about the level of pelvic organ prolapse.

In our study, there was FAIR association between POP-Q system and S-POP scoring system of stage II and stage III for anterior wall prolapse. Association was GOOD of stage II and FAIR of stage III for central compartment and VERY GOOD of stage II and FAIR of stage III for overall prolapse between POP-Q system and S-POP scoring system. Though the association was POOR at all the stages for posterior wall prolapse, the strength of agreements between POP-Q system and S-POP scoring system were 78.57%, 61.90%, 71.43% and 66.15% for anterior wall, posterior wall, central compartment, and overall prolapse respectively. Our study mentions about intersystem association between POP-Q system

and S-POP scoring system at all the stages of anterior wall, posterior wall, central compartment, and overall prolapse separately. Overall association between POP-Q system and S-POP scoring system in other studies was as follows: First study of Dhama et al.<sup>14</sup>—0.784 (GOOD association), Raizada et al.<sup>13</sup>—0.82 (VERY GOOD association), Manonai et al.<sup>15</sup>—0.80 (GOOD association), Singh et al.<sup>16</sup>—0.82 (VERY GOOD association), and Narathorn et al.<sup>17</sup>—0.77 (GOOD association).

## CONCLUSION

The above study concludes that there was FAIR association between POP-Q system and S-POP scoring system of central compartment and overall prolapse, respectively. Though the association was POOR for posterior wall prolapse, the strength of agreement was more than 50% at all the stages.

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