Association of Parity and Pelvic Organ Prolapse

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Abstract

Background: To determine association between parity and pelvic organ prolapse in women presenting to a tertiary care hospital of Rawalpindi.
Methods: This case control study was conducted at Gynecology department of Holy Family Hospital Rawalpindi from January to June 2016. Study population comprised of women >40years of age. Among 228 women, included in study, 114 were cases who presented with pelvic organ prolapse compared to 114 controls being normal healthy women. Information was collected regarding age, parity, prolapse, history of heavy physical work, hysterectomy etc.
Results: The mean parity of cases was 5.20 ±2 while mean parity of controls was 3.97 ±2.3 (p value 0.00). Highly statistically significant association was observed between parity >5 and pelvic organ prolapse with an Odd’s ratio 2.9 (95% CI =1.16-4.27, p value 0.01). Cases and controls were heterogeneous based on age (p value 0.001) and history of heavy physical work (p value 0.00) so adjusted Odd’s ratio was also calculated for age (aOR 2.61) and heavy physical work (aOR 2.03).
Conclusions: Odds of development of pelvic organ prolapse were almost 3 times more in women with high parity compared to women with low parity while age and history of heavy physical work were found to be strong confounders of relationship of parity and pelvic organ prolapse.
Keywords: Pelvic organ, Prolapse, Parity, Age, Gender, Hysterectomy.

Introduction

Pelvic organ prolapse refers to the abnormal herniation of pelvic viscera i.e uterus, bladder, rectum, small or large bowel or vaginal vault, against the vaginal walls or through the vaginal introitus.1-2 Pelvic organ prolapse is a very common complaint, resulting in >200,000 women per year requiring surgical procedures for prolapse later in life.3 According to Women’s Health Initiative study investigators found a 41.1% prevalence of pelvic organ prolapse in postmenopausal women older than 60 years who had not had a hysterectomy.4 Pelvic organ prolapse among postmenopausal women is common worldwide. Racial differences were also reported hence Caucasian women have a 3 fold greater rate of pelvic organ prolapse surgery than the African American women. An overview of pelvic organ prolapse in developing countries showed 30.8% prevalence among Swedesh women ages 20 to 59 and there are 2 hospitalizations for pelvic organ prolapse per 1000 persons-years by the age 60 in British Women.5 Sajan and Fikree has reported that 19.1% of women in Pakistan who were younger than age 30 reported the symptoms of prolapse.6 The incidence of pelvic organ prolapse surgery ranges from 1.5 to 1.8 per 1000 women-years and is more common in women aged 60 to 69.5 Both the Oxford Family Planning Study and the Women’s Health Initiative showed vaginal parity to be the major risk factor for pelvic organ prolapse.7 The Women’s Health Initiative also noted that single child birth was associated with an increased risk of uterine prolapse and every additional delivery (up to 5 births) increased the risk of prolapse by 10% to 20%.7 From the literature ,women with 4 or more vaginal deliveries have 12 times greater risk of genital prolapse than women with less than 4 vaginal deliveries.8 It is considered that vaginal delivery is responsible for damage to the pudendal nerve leading to the development of pelvic organ prolapse. It also appears that instrumental vaginal delivery, especially forceps delivery further increases the risk.9 According to world fact book in Pakistan birth rate is 22.58 births/1000population however birth rate in U.S is 12.49 births/1000 population.10 Hence women in Pakistan are at greater risk to suffer from odds of pelvic organ prolapse. Therefore, it is of great importance to highlight both modifiable and non modifiable risk factors for pelvic organ prolapse so that preventive measures can be taken to reduce the public health burden associated with pelvic organ prolapse. These measures include imparting awareness among the general population about the long term complications of high parity in the mothers and also promoting the use of contraceptive measures and effective family planning services by eligible couples.
Due to the distressing consequences of pelvic organ prolapse, its possible relationship with high vaginal parity and the general high fertility rates in our community, our study aims to bring out a clear cut connection between the two so that the ways to reduce possible disease load may be exercised. Therefore the objective of our research was to determine association between vaginal parity and pelvic organ prolapse in women > 40 years presenting to Gynecology and Medicine department, Holy Family Hospital, Rawalpindi.

Patients and Methods
A case control study was conducted from January 2016 to July 2016, in the Department of Gynecology, Holy Family Hospital, Rawalpindi. Study population consisted of all women >40 years of age who delivered only vaginally, included after informed written consent in our study. Whereas women who delivered through cesarean section, pregnant women, women seeking oncology consultation or confirmed cases of pelvic carcinoma and women with history of chronic cough or constipation were excluded. Cases were women over the age of 40 years, with confirmed pelvic organ prolapse. Whereas, controls were normal healthy women over the age of 40 years, with no pelvic organ prolapse and were healthy women with no medical, gynecological or obstetric morbidity selected from the attendants of patients presenting to medicine OPD of the same hospital. The diagnosis of presence or absence of pelvic prolapse was further confirmed through Physical examination checking for anterior, apical and posterior wall descent of vaginal wall. For the cases, data was further collected retrospectively from their past medical records regarding previous history, previous physical examination or any diagnostic investigations carried out for confirmation of pelvic prolapse.

WHO sample size calculator was used to calculate the minimally required sample size, keeping cases to control ratio as 1:1, expected percentage of parity in cases of pelvic organ prolapse as 94.79% and expected percentage in controls 81.02%, anticipated odds ratio of 4.2611, power of the study 80% and level of significance as 5%, minimally required sample was calculated to be 114 cases and 114 controls. Information gathered from subjects included their age, vaginal parity, pelvic organ prolapse, type of prolapse, menopausal status, history of heavy physical work, history of pelvic floor surgery and hysterectomy status. After the collection of required data in structured performas, it was finally entered and analyzed using the statistical package for social sciences (SPSS version 20). For all the categorical variables like parity ≥5 or not, type of prolapse, menopausal status; frequencies and Percentages were calculated while numerical variables like age and exact parity were presented as means along with Standard Deviations.

To compare the proportions of those who developed pelvic organ prolapse and those who did not, in both study groups, person’s Chi-square test was applied at 5% level of significance. p- Value of <0.05 was considered statistically significant. Odds ratios were calculated through Med-calc online calculator along with 95% confidence intervals, whereas the adjusted odds ratios and difference of percentages of adjusted odds ratios calculated was determined through manual calculations using formulae.

Results
A total of 228 women were included in our study where 114 were cases and 114 were controls. The mean age of all study participants was calculated to be 51.78 ±10.141 years and its range was 48 years, youngest woman being 40 years old while eldest was 88 years old. The mean age of cases was 53.96±10.91 years while the mean age of controls was 49.60±8.82 years and both the groups were heterogeneous based on age with a p-value of 0.001. In the cases of our study population the commonest type of prolapse was observed to be Cystoenterocele 61 (26.8%) , followed by cystocele 37 (16.2%), uterine prolapse 10(4.4%), cysto enterocele with uterine prolapse and cystocele with uterine prolapse 2 (0.9%), vaginal vault prolapse and enterocelle 1(0.4%) was the least common. The parity of 112 (49.1%) mothers was >5 whereas for remaining 116 (50.9%) the parity ranged from 0 to 5 amongst all 228 study participants. The overall mean parity was 4.59±2.242. The mean parity of cases was 5.20±2.00 while mean parity of controls was 3.97±2.30) with a highly statistically significant difference. (t-statistic= 4.29 and p-value 0.00).

Parity was also categorized as up to 5 and more than 5 and both study groups displayed highly statistically significant difference (Chi statistic= 15.79, p-value 0.001) The odds of development of pelvic prolapse was almost 3 times more in women with high parity compared to odds of pelvic prolapse in women with low parity (Odds ratio 2.93, 95% Confidence interval 1.71 to 5.03).

Out of total 228 participants 73(32%) are premenopausal and 155(68%) are post menopausal. History of frequent heavy physical work in current pregnancy was positive in 96 participants (42.1%) and negative in 132 participants (57.9%). This history was...
specifically asked from cases regarding any heavy physical work performed on frequent basis, before development of prolapse, whereas for controls since there was no pelvic prolapse present so it was asked generally regarding any heavy physical activity performed frequently. In study population 10 participants (4.4%) had hysterectomy and 218 participants (95.6%) had no history of hysterectomy. Only 1 (0.4%) participant had previous pelvic floor surgery and remaining 227 (99.6%) had not. The comparison of cases and controls for each of these characteristics is displayed in (table 1).

Table 1. Comparison of cases and controls for study characteristics.

<table>
<thead>
<tr>
<th>Study characteristics</th>
<th>Cases</th>
<th>Controls</th>
<th>X² Statistic</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>N=114</td>
<td>N=114</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 50 years</td>
<td>58 (33.3%)</td>
<td>64 (56.1%)</td>
<td>11.99</td>
<td>0.001</td>
</tr>
<tr>
<td>More than 50 years</td>
<td>76 (66.7%)</td>
<td>50 (43.9%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>History of heavy physical activity</td>
<td>75 (64%)</td>
<td>23 (20.2%)</td>
<td>44.98</td>
<td>0.000</td>
</tr>
<tr>
<td>Hysterectomy</td>
<td>3 (2.6%)</td>
<td>7 (6.1%)</td>
<td>1.67</td>
<td>0.196</td>
</tr>
<tr>
<td>History of previous pelvic floor surgery</td>
<td>113 (99.1%)</td>
<td>114 (100%)</td>
<td>1.00</td>
<td>0.136</td>
</tr>
</tbody>
</table>

Considering the heterogeneity of study groups based on age and history of frequent heavy physical work in current pregnancy, stratified analysis was also performed to determine adjusted Odds Ratio. (table 2). Percent Difference of Adjusted Odds Ratios of age and previous physical activity exceeded 10% hence they were found to be strong confounders of relationship of parity and pelvic prolapse. Therefore age above 30 years and physical work contribute to development of pelvic prolapse also, however removing the contribution of age showed that parity increased the risk of occurrence of pelvic prolapse, only 2.6 times and not 2.9 times. Similarly removing the contribution of heavy physical work showed that parity increased the odds of occurrence of pelvic prolapse only 2 times and not 2.9 times.

Discussion

This study examined the contribution of parity to the development of pelvic organ prolapse across a broad range. The findings of this study reveal that a woman with 5 children has a risk of pelvic organ prolapse, that is higher than a woman with less than 5 children.

Table 2. Stratified Analysis:

<table>
<thead>
<tr>
<th>Factors</th>
<th>Parity</th>
<th>Cases</th>
<th>Controls</th>
<th>Adjusted odds ratio (aor)</th>
<th>Percent difference of aor with crude or 2.23</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age up to 30 years</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 5</td>
<td>18 (47.4%)</td>
<td>45 (70.3%)</td>
<td>18 (47.4%)</td>
<td>45 (70.3%)</td>
<td>2.61</td>
</tr>
<tr>
<td>&gt;5</td>
<td>20 (52.6%)</td>
<td>19 (29.7%)</td>
<td>20 (52.6%)</td>
<td>19 (29.7%)</td>
<td></td>
</tr>
<tr>
<td>Age above 30 years</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 5</td>
<td>25 (32.9%)</td>
<td>28 (56.0%)</td>
<td>25 (32.9%)</td>
<td>28 (56.0%)</td>
<td>4.05</td>
</tr>
<tr>
<td>&gt;5</td>
<td>51 (67.1%)</td>
<td>22 (34.0%)</td>
<td>51 (67.1%)</td>
<td>22 (34.0%)</td>
<td></td>
</tr>
<tr>
<td>History of heavy physical activity positive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 5</td>
<td>31 (42.5%)</td>
<td>13 (35.0%)</td>
<td>31 (42.5%)</td>
<td>13 (35.0%)</td>
<td>2.03</td>
</tr>
<tr>
<td>&gt;5</td>
<td>42 (57.5%)</td>
<td>10 (65.0%)</td>
<td>42 (57.5%)</td>
<td>10 (65.0%)</td>
<td></td>
</tr>
<tr>
<td>History of heavy physical activity negative</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 5</td>
<td>12 (29.3%)</td>
<td>60 (65.9%)</td>
<td>12 (29.3%)</td>
<td>60 (65.9%)</td>
<td>2.03</td>
</tr>
<tr>
<td>&gt;5</td>
<td>29 (70.7%)</td>
<td>31 (34.1%)</td>
<td>29 (70.7%)</td>
<td>31 (34.1%)</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1: A bar chart displaying the comparison of cases and controls for age, History of heavy physical work, hysterectomy status, history of pelvic surgery and menopausal status Figures

There are conflicting reports about the influence of parity, labour and mode of delivery on the development of pelvic organ prolapse. Our results have extended the work of Larsson et al who found that women who had vaginal deliveries had a strong association between their parity and the risk of surgery for pelvic organ prolapse, in an almost linear
fashion [Adjusted OR was 0.18 (0.16-0.20) and overall hazard ratio 0.20 (0.18-0.22)] \textsuperscript{12}. According to study by Nygaard, higher vaginal parity (OR 1.61, 95% CI 1.03-2.50) was associated with the risk of prolapse when defined as stage II or greater. \textsuperscript{13} Consistent with the finding of these studies our study shows that high

parity increases the risk of pelvic organ prolapse as compared to those with low vaginal parity. However according to the work of Quiroz et al first birth is associated with a remarkably increased odds of prolapse (OR 9.73, 95% CI 2.68-35.4), while further births have a marginal impact on this association (OR 1.09 for each additional birth, 95% CI 0.87-1.38).\textsuperscript{11} Our findings are slightly different in respect that the odds of pelvic organ prolapse increase with increasing parity. The mean parity of women in this study was 4.59 (SD ±2.242); the high mean parity is consistent with the mean parities in other studies.\textsuperscript{14,15} It has also been demonstrated that there is 12% increase in the incidence of pelvic organ prolapse with each year of advancing age, hence roughly doubling the incidence for every decade of life.\textsuperscript{16} Our findings are indirectly coherent to it as we observed that pelvic organ prolapse is more prevalent in the age group >50 years. Marchionni et al after following up to 2670 women over 11 years demonstrated that incidence of vaginal vault prolapse was low after hysterectomy is performed in the absence of any defect in the pelvic support.\textsuperscript{17} This supports our observation that only few participants i.e 2.6% who presented with pelvic organ prolapse had hysterectomy. The risk factor of heavy physical work in women with pelvic organ prolapse was reported by woodman et al too, however they included only premenopausal women and we have similar findings with both pre and postmenopausal women.\textsuperscript{18} We also observed that the most common type of pelvic floor prolapse was Cystoenterocele 61 (26.8\%) and this is partially contradicting with a previous research that showed Uterine prolapse and cystocele as commonest types of prolapse.\textsuperscript{15} The strength of our study design is that we analytically concluded the causal relationship between parity and prolapse, taking adequate sample of Pakistani women, that was not previously explored at national level previously. In addition we not only defined pelvic organ prolapse by its symptoms, that is feeling or seeing a vaginal bulge but also through physical examination and records of diagnostic investigations. In a recent article similar questions about vaginal bulging were demonstrated to have high sensitivity and specificity for the presence of pelvic organ prolapse.\textsuperscript{19} In addition for 114 cases taken, obstetric exposures were defined by hospital records from obstetric, rather than maternal recall. The weakness of our study is that our sample was confined to one facility and had majority of one specific ethnic group so was not representative of all ethnic groups, considering multiethnic character of Pakistani population. In addition we cannot exclude the possibility that some unmeasured characteristics of the population or other exposures were relevant to the development of pelvic floor disorders.

**Conclusion**

Odds of development of pelvic organ prolapse were almost 3 times more in women with high parity compared to women with low parity while age and history of heavy physical work were found to be strong confounders of relationship of parity and pelvic organ prolapse.

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**References**