The medical and surgical termination of a pregnancy, known as abortion, is becoming more common among women in Nepal. Adenomyosis is a common gynecological problem among reproductive-aged women; however, little is known about the relationship between abortion and adenomyosis. This study aimed to explore the risk factors for adenomyosis in women who have undergone abortions.

**Methods**

A comparative study was conducted among women visiting the Department of Obstetrics and Gynaecology at Tribhuvan University Teaching Hospital, Kathmandu, between 13th April 2016 and 14th July 2017. Adenomyosis was confirmed through histological examination after hysterectomy. Data were analyzed using SPSS software (version 21.0). Odds ratios (OR) with 95% confidence intervals and p-values were calculated. A p-value equal or below 0.05 was considered statistically significant.

**Results**

Of the total 255 women, 85 were confirmed with adenomyosis by histological examination. Among these, 39% (33/85) had a history of abortion, compared to only 25% (44/170) among women without adenomyosis. Women with a history of abortion were 1.8 times more likely to develop adenomyosis (95% CI: 1.04-3.17, p-value = 0.03) compared to women without abortion history. Women with surgical abortions were 2.5 times more likely to develop adenomyosis (95% CI: 1.03-6.21, p-value = 0.03) compared to women without abortion history.

**Conclusions**

This study found that women who have abortions are more likely to have adenomyosis compared to women without abortions. Further studies are needed to extend the findings of this study.

**Keywords**

Abortion; adenomyosis; risk factors
A total of 255 women were included in this study. Of the total, 85 cases (35%) were histologically confirmed adenomyosis, while 170 (65%) cases were non-adenomyosis.

As shown in figure 1, the majority of patients with adenomyosis were between the age group of 41-50 years (69%) followed by the age group of 51-60 years (17%) and 30-40 years (12%) respectively.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Adenomyosis N=85 (%)</th>
<th>Non Adenomyosis N=170 (%)</th>
<th>OR (95% CI)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abortion</td>
<td>Yes</td>
<td>33 (39)</td>
<td>44 (25)</td>
<td>1.8</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>52 (61)</td>
<td>126 (75)</td>
<td></td>
</tr>
</tbody>
</table>

Abortion was found higher (39%, 33/45) in adenomyosis group compared to non-adenomyosis (25%, 44/170) groups as shown in Table 1.

The results showed that the odds of having adenomyosis was 1.8 times greater in women who had history of abortions (OR=1.8, CI=1.04-3.17; P value= 0.03) than those who never had abortions (Table 1), and this finding was statistically significant.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Adenomyosis N=33 (%)</th>
<th>Non Adenomyosis N=44 (%)</th>
<th>OR (95% CI)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abortion</td>
<td>Medical</td>
<td>22 (67)</td>
<td>33 (75)</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td>Surgical</td>
<td>11 (33)</td>
<td>11 (25)</td>
<td></td>
</tr>
</tbody>
</table>

Of the total 77, surgical abortion was found higher in women with adenomyosis (33%, 11/33) compared to women with non-adenomyosis (25%, 11/44) as shown in Table 2.

Women with prior surgical abortions found significantly associated with adenomyosis (OR=2.5, 95% CI=1.03-6.21; P=0.03) compared to women without abortions (Table 2).

**DISCUSSION**

The prevalence rate of adenomyosis in hysterectomy patients over the past 50 years has ranged from 8.8% to 61.5% and the wide range frequently of adenomyosis might be due to lack of standard histopathological criteria for diagnosis. The prevalence of adenomyosis is found to be 23.5% in the Indian population, while 71% in women in Pakistan. In our study, the prevalence of adenomyosis at hysterectomy was 35%. Similar observations were made in other studies conducted in Nepal. In this study, adenomyosis was found common in middle-aged women. This result is consistent with previous studies conducted elsewhere.

The exact cause of adenomyosis is unclear, but some of the factors are considered to cause adenomyosis in women. There have been a number of studies that have demonstrated relationship between adenomyosis and age, multiparity, previous dilatation and curettage, cesarean section, smoking and abortion. A relationship between abortion and adenomyosis, however, is not well established and mixed results have been shown in previous studies. In fact, majority of the studies, that examine induced abortion found negative association with adenomyosis. In Nepal, Shrestha et al. showed several risk factors for adenomyosis, however, no information is available about the relationship between induced abortion and adenomyosis. In Nepal, abortions have been increased drastically, since it was first legalized in 2002. Most of the studies regarding abortions are focused on unsafe abortions and maternal deaths. However, abortion as a risk factor for adenomyosis is not well established. This study, thus, focused on the association between abortion and adenomyosis in women.

Abortion, the medical and surgical termination of a pregnancy, is common and legally performed since 2004 across the country. Abortion with pills is more common, particularly among women compared to surgical abortion in Nepal. In our study, medical abortion was positively associated with adenomyosis in comparison with those who had no history of abortion.
This finding, however, is in contrast to findings reported by Parrazini et al. and Shrestha et al., who found women with induced abortion were not at risk of having adenomyosis.\textsuperscript{6,12} Although, this study showed significant association between medical abortion and adenomyosis, more comprehensive studies are needed to extend the result of this study.

There are mainly two types of surgical abortion: vacuum aspiration and dilatation and curettage. Women having prior surgical abortion such as dilatation & curettage have been found higher risk of adenomyosis in previous studies.\textsuperscript{7,12} However, relationship between manual vacuum aspiration and adenomyosis is not well known. In Nepal, Shrestha et al. reported higher risk of adenomyosis in women who had prior dilatation & curettage.\textsuperscript{6} In this study, adenomyosis was found higher frequency in women after surgical abortion (i.e., manual vacuum aspiration). Manual vacuum aspiration is more common than dilatation and curettage (17% vs 7%) procedures performed in Nepal,\textsuperscript{14} further study, therefore, is needed to understand the relationship between manual vacuum aspiration procedure and adenomyosis.

Although this study was conducted in a tertiary hospital in Kathmandu, multi-centric studies are needed to acquire a greater understanding on the relationship between abortion and adenomyosis. This study, however, clearly demonstrated that abortion, especially surgical abortion, is strongly associated with adenomyosis that lays the groundwork for future study.

CONCLUSIONS

Women with a history of abortion, are more likely to have been diagnosed with adenomyosis compared to women without abortion. After legalization of abortion, it is becoming more common among women in Nepal. Future studies on the relationship between abortion and adenomyosis are, hence recommended to extend the findings of this study.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

REFERENCES