ARTICLE INFO

Received: 27 March 2018
Revised: 09 April 2018
Accepted: 19 April 2018

ABSTRACT

Background: Despite being a frequent plastic surgery complaint, the causes and predisposing factors for breast ptosis have not been studied profoundly. Studying ptosis causative factors will improve prevention, patient select and education, surgical outcome, and patient education. The present study aims to demonstrate the potential predisposing factors for breast ptosis.

Methods: In a 6-month study was conducted at the research department of Kaviani Breast Diseases Institute, Tehran, Iran, all female patients referring to the breast clinic were assessed. Patients with a background of severe comorbidities, history of breast surgery, and breast cancer were excluded. Data on demographic characteristics, current and past medical history, physical examination, and ptosis presence grade were collected.

Results: A total number of 141 patients, with the mean age of 35.8 years, were included. About 72% of the patients had varying grades of breast ptosis. Patients with ptosis tended to be of older age, weight, BMI, and brassiere size, were more likely to be menopausal, and had begun wearing brassiere at younger ages. The ordinal model revealed an association between ptosis and age, age at wearing brassiere, current breast size, and smaller cup size in patients.

Conclusion: We suggest age and breast size as the predisposing factors for breast ptosis. In our study, there was no relation between breast ptosis and history of lactation or the number of pregnancies. The effects of hormonal and menstrual status, as well as drinking and smoking habits, need to be investigated further.

Introduction

Breast ptosis is a common complaint among plastic surgery patients. Mastopexy is a common cosmetic surgery for improving the shape of the ptotic breast, which is preformed either alone as breast lift surgery, or in combination with reduction mammoplasty or breast augmentation. Despite the high prevalence of breast ptosis, only a small number of studies have demonstrated its causes and risk factors in a research-based method, and most of the suggested risk factors are based on experience. Ptosis is not only a cosmetic issue of the breast, but also an important factor in therapeutic breast surgeries for breast cancer. Ptosis can affect technique selection in both oncoplastic and reconstructive breast surgeries for breast cancer patients.

Breast ptosis can be a consequence of parenchymal maldistribution as well as connective tissue and skin dysfunction. Aging, weight change, pregnancy, menopause, and lactation are among the events in a woman’s life that can affect the breasts through alterations in hormonal and structural components of
Breast ptosis and predisposing factors

To the best of our knowledge, very few studies have assessed the etiologic factors of breast ptosis or have addressed the present controversies regarding the probable causes, and most were focused on lactation from a maternity rather than plastic surgery aspect. The importance and need for such studies will be prominent when one considers that knowing the risk factors not only can improve the efficacy of prevention, patient selection for surgical corrections, and the clinical outcome of such interventions, but also helps to educate patients and clarify some cultural notions. For instance, the low rates of breast-feeding in both developed and developing countries have not changed after several years of education for fear of adverse effects on breast shape and cosmetics as one of the main mentioned causes. Surprisingly, this wrong notion does not seem to be restricted to specific cultural or geographical distribution.

One can assume that understanding the actual predisposing factors will address the aforementioned advantages in plastic surgery. Considering these facts, we designed the present study to demonstrate and determine the probable risk factors for breast ptosis.

Methods

Study Design and Participants

Female patients referring to Kaviani Breast Diseases Institute in Tehran, Iran, between January and June 2013 were assessed for the presence of ptosis and its grade. We used the classification introduced by Regnault in 1976 for grading of ptosis. This classification is based on the position of the nipple: Grade I ptosis is described as the nipple being located at or up to 1 cm below the inframammary fold (IMF); in grade II, the nipple is located at a level 1 to 3 cm below IMF; and grade III ptosis is defined as the nipple being located more than 3 cm below IMF or at the inferior pole of the breast. 

Patients with a history of breast surgery, breast cancer, or severe underlying medical conditions causing weight change in a short period (at least a month), including Cushing’s syndrome, Addison’s disease, severe thyroid diseases, and metabolic syndrome, and all patients requesting cosmetic breast surgeries were excluded from the study. All the questionnaires were anonymous, and patients’ data were kept confidential during the study. The study protocol was approved by the Tehran University of Medical Sciences Ethics Committee, and the informed consent was taken from patients after explaining the study and emphasizing on the confidentiality of the collected data.

Definition of Variables

The data regarding patients’ demographics and history, such as age, age at menarche, menopause age, age at beginning to wear brassiere, weight, BMI, education level, number of pregnancies, total number of lactating months, brassieres size before pregnancy and its changes, weight gain after each pregnancy were gathered through a structured interview (all the data were self-reported except for weight and height, which were measured by the same devices). In regard to smoking, patients were categorized into two groups of smokers/ex-smokers and nonsmokers. The same stratification was applied to alcohol consumption. Current brassiere and cup sizes were determined by a surgeon, using the underbust girth for the brassiere size according to the EN 13402 dress-size standard, and the alphabetic method for cup size, both of which are the current measuring systems in Iran as well.

Statistical Analysis

SPSS v. 19 (IBM Inc.) was used for data analysis. Data are presented as number (percent) or mean ± standard deviation. The means were compared using the student t test. Analysis of variance (ANOVA) was employed to compare the different grades of ptosis with interested risk factors. Factors showing significant association with ptosis in univariate analyses were put in a multivariate analysis to identify the independent associations between the potential risk factors of breast ptosis. A P value of 0.05 was considered the cut point for significant statistical difference.

Results

A total of 141 patients were included in the study. The patients’ mean age was 35.92 ± 9.42 years (ranging from 17 to 62 years). The mean age of menarche was 13.45 ± 1.58 years. The mean duration of lactation was 32.10 ± 18.70 months. Table 1 presents the detailed demographic specifications of the study population. A total number of 102 cases (72.3%) were diagnosed with varying grades of breast ptosis, while 37 (26.2%) did not have ptosis and 2 (1.5%) had pseudo-ptosis. The patients with pseudo-ptosis in the examination were assigned to the no-ptosis group. Moreover, we classified breast ptosis into two groups: minor ptosis (grade 1) and moderate to major ptosis (grades 2 and 3).

Patients with higher grades of breast ptosis tended to be of older age, higher weight, and BMI and were more likely to be menopausal. No significant differences were observed between the groups in the other variables (Table 2).

Variables showing significant difference among the three groups in univariate analyses were put in an ordinal model to investigate the independent role of each one. As shown in Table 3, older patients were more commonly diagnosed with breast ptosis (95% CI: 0.020 to 0.109, P = 0.005). The younger age at wearing brassiere was associated with higher grades of breast ptosis (95% CI: -0.533 to -0.084, P = 0.007). Current brassiere and cup sizes were also
Table 1. Demographic Characteristics of the Study Population

<table>
<thead>
<tr>
<th>Variables</th>
<th>Categories</th>
<th>Mean ± SD or N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>35.83 ± 9.42</td>
<td></td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>65.85 ± 11.07</td>
<td></td>
</tr>
<tr>
<td>Height (cm)</td>
<td>162.12 ± 5.85</td>
<td></td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>24.48 ± 4.54</td>
<td></td>
</tr>
<tr>
<td>Age at menarche</td>
<td>13.46 ± 1.57</td>
<td></td>
</tr>
<tr>
<td>Menopause age (N = 12)</td>
<td>45.91 ± 5.59</td>
<td></td>
</tr>
<tr>
<td>Number of pregnancies (N = 95)</td>
<td>2.27 ± 1.36</td>
<td></td>
</tr>
<tr>
<td>Total months of lactation (N = 86)</td>
<td>31.86 ± 18.54</td>
<td></td>
</tr>
<tr>
<td>Weight gain after each pregnancy (N = 91)</td>
<td>7.86 ± 4.53</td>
<td></td>
</tr>
<tr>
<td>Age at beginning to wear brassiere</td>
<td>14.28 ± 1.88</td>
<td></td>
</tr>
</tbody>
</table>
| Current or past smoker     | No: 36 (96.5%)  
Yes: 5 (3.5%)     |
| Current or past alcohol consumption | No: 133 (94.3%)  
Yes: 8 (5.7%)     |

Table 2. Comparison of the Variables Between Ptotic and Non-ptotic Patients

<table>
<thead>
<tr>
<th>Variables</th>
<th>No ptosis</th>
<th>Minor Ptosis</th>
<th>Moderate-Major Ptosis</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.005</td>
<td>0.006</td>
<td>&lt; 0.001</td>
<td></td>
</tr>
<tr>
<td>Age at menarche</td>
<td>&lt; 0.001</td>
<td>&lt; 0.001</td>
<td>&lt; 0.001</td>
<td></td>
</tr>
<tr>
<td>Age at beginning to wear brassiere</td>
<td>0.020</td>
<td>&lt; 0.001</td>
<td>&lt; 0.001</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>&lt; 0.001</td>
<td>&lt; 0.001</td>
<td>0.025</td>
<td></td>
</tr>
<tr>
<td>BMI</td>
<td>0.227</td>
<td>0.529</td>
<td>0.025</td>
<td></td>
</tr>
<tr>
<td>Number of pregnancies</td>
<td>&lt; 0.001</td>
<td>&lt; 0.001</td>
<td>0.025</td>
<td></td>
</tr>
<tr>
<td>Lactation duration (month)</td>
<td>0.258</td>
<td>0.610</td>
<td>0.290</td>
<td></td>
</tr>
<tr>
<td>Number of breast-feedings</td>
<td>0.437</td>
<td>0.342</td>
<td>0.049</td>
<td></td>
</tr>
<tr>
<td>Weight gain after each pregnancy (kg)</td>
<td>0.290</td>
<td>0.764</td>
<td>0.342</td>
<td></td>
</tr>
</tbody>
</table>
| Current or ex-smoker       | No: 37 (94.9%)  
Yes: 2 (5.1%)     |
| Current or past alcohol consumption | No: 35 (89.7%)  
Yes: 4 (10.3%)     |
| Menstrual status           | Menstruation: 39 (100%)  
Menopause: 0 (0%)     |
| Current brassiere size (cm) | 0.049     | < 0.001      | < 0.001               |         |
| Current cup size           | A: 18 (46.2%)  
B: 12 (30.8%)  
C: 9 (23.1%)  
D: 0 (0%)     |

Table 3. Multivariate Analysis of Factors With Association With Breast Ptosis

<table>
<thead>
<tr>
<th>Variables</th>
<th>P value</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.005</td>
<td>0.020</td>
</tr>
<tr>
<td>Current brassier size</td>
<td>&lt; 0.001</td>
<td>0.117</td>
</tr>
<tr>
<td>Current cup size</td>
<td>&lt; 0.001</td>
<td>0.489</td>
</tr>
</tbody>
</table>

*Nagelkerke = 58.8%*

Discussion

Despite being one of the most common cosmetic problems for women, only a few studies have evaluated the impact of possible risk factors on breast ptosis, and most of the studies about breast ptosis have referred to surgical techniques for solving the problem. As it can be assumed, breast ptosis and predisposing factors are complex and multifactorial. The relationships between ptosis grade and different factors were investigated. The mean weight of patients was observed to be different for different grades of ptosis based on the ANOVA test (P < 0.001) independently associated with ptosis (95% CI: 0.117 to 0.268, P < 0.001 and 95% CI: 0.489 to 1.461, P < 0.001).

The relationships between ptosis grade and different factors were investigated. The mean weight of patients was observed to be different for different grades of ptosis based on the ANOVA test (P < 0.001) independently associated with ptosis (95% CI: 0.117 to 0.268, P < 0.001 and 95% CI: 0.489 to 1.461, P < 0.001).
Breast ptosis and predisposing factors

ptosis etiology has a multi-factorial nature and can be affected by dependent and independent factors such as race, culture, body composition, and age as well as hormonal changes. Regression of the glandular tissue due to hormonal changes after menopause or pregnancy, weight loss, skin pathologies, and previous surgery have been mentioned as potential causes of breast ptosis.\(^1\)\(^2\)\(^3\)\(^4\)\(^5\) All of the 12 menopausal patients in the present study had some degrees of ptosis, providing evidence for the aforementioned effect of menopause. None of the patients in this study had a history of breast surgery or dermatochalasis.

We observed an association between the cup size and ptosis grade. Patients with no ptosis were mostly size A, while patients with minor ptosis were size B, and more than half of the patients with moderate to major ptosis had a C cup size. In this study, we inquired the weight gain after the pregnancy to evaluate its effect. The mean weight gain after the pregnancy did not show statistically significant difference between the ptosis and no-ptosis groups. Unfortunately, we did not inquire the history of weight loss and were not able to evaluate its effect on breast ptosis.

The weight of the breast itself and the laxity degree of the breast-supporting ligaments are other proposed causative factors for breast ptosis. In the present study, we considered the breast cup size as a measure of the breast volume and mass. Although the cup size is not a perfect indicator of the breast weight due to variation in breast density and the several factors affecting it, the current cup size of the patients at the study time was higher in the ptosis group compared with the no-ptosis group. Meanwhile, as the mean weight of the ptotic patients was greater, the breast cup size and breast weight might have increased as a consequence of weight and body fat distribution. However, both factors lost their significant association with ptosis in multivariate analysis. Accordingly, the causative effect of the breast volume and weight need to be assessed in a more detailed study to check whether breast volume is an independent breast ptosis risk factor, or it is merely a manifestation of higher weight and BMI as main risk factors.

Laxity of the Cooper’s ligaments as another potential cause for ptosis, which is suggested mostly based on the individual observations, needs to be proved through scientific, experimental methods. As suggested by previous studies,\(^6\)\(^7\) smoking is a cause for abnormal elastic characteristics of the skin, was studied in our patients along with drinking history. There were some limitations in our study to assess the effect of cigarette smoking or alcohol consumption on the development of breast ptosis. Considering a negative attitude towards female smokers in the society, we can assume that this fact might have influenced the overall prevalence of the smoking cases in our study through patients’ disclosure of their smoking status to the study team. Religious considerations can be applied to alcohol consumption besides the overall lower consumption of alcohol in the Iranian population, especially in females (relative frequency in total population = 2.31%, females = 0.56%).\(^8\)\(^9\)\(^10\)

None of the patients in the non-ptosis group were in the menopause phase of the reproductive physiology, while 11% (12 patients) of the ptotic patients were in this phase. This may be indicative of a protective effect of the female reproductive hormones, or it can just be a manifestation of the age factor. Considering the not-confirmed effect of lactation in breast ptosis in the previous studies as well as the present one, and also lack of difference for the number of pregnancies between the two groups are shown.

Considering the available data, we suggest age and breast size as risk factors for breast ptosis. In addition, the age at beginning to wear brassiere was associated with having ptosis in our study, although it was not clear whether the patients began to wear brassiere at younger ages because of earlier onset of puberty or other considerations such as cultural issues. Obviously, further studies are needed to clarify the highly probable effects of female hormones as well as menstrual status on development of breast ptosis. The effects of smoking and alcohol consumption also need to be investigated in studies with greater sample sizes. In our study, there was no relationship between breast ptosis and breast-feeding, number of pregnancies, duration of lactation, or weight gain after pregnancy, a finding which can help decrease stress regarding having ptosis following childbirth and lactation. Moreover, we suggest studies to demonstrate patients before pregnancy, during pregnancy, during lactation, and after weaning and compare with a control group. Also, another limitation of our study was generalizability of results as the included subjects were those referring to a private clinic.

**Conflict of Interest**

All the authors declare that they have nothing to disclose.

**References**