Pathological Complete Response Following Neoadjuvant Chemotherapy in Operable Breast Cancer Patients: Is Obesity a Predictive Factor?

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BACKGROUND

- Overweight and obesity are associated with greater disease specific mortality and overall mortality in breast cancer patients [1, 2].
- Neoadjuvant chemotherapy offers a unique setting to assess breast cancer chemo-sensitivity in vivo, and thus can help us understand why obesity is associated with poor prognosis in breast cancer patients [3].
- So far, the effect of increased body mass index (BMI) in breast cancer patients undergoing neoadjuvant chemotherapy (NACT) remains controversial.

PURPOSE

- To review and analyze if increased BMI is associated with lower pathological complete response (pCR) rate for operable breast cancer after NACT.

METHODS

- Data Sources: PubMed and Cochrane database till December 31, 2018
- Study Selection: We included observational studies and randomized trials that evaluated association of BMI with pCR in operable breast cancer patients that underwent NACT.
- Data Extraction and Analysis: Two authors independently extracted data and rated the study quality.

RESULTS

- 13 studies including a total of 14179 women with operable breast cancer who underwent NACT were identified.
- 2 studies were pooled analysis of prospective clinical trials (10622 patients).
- 11 studies were retrospective case control studies (3557 patients).
- We later excluded one study (120 patients) which compared BMI ≥ 30 to BMI < 30 instead of using BMI of 25 (adopted by all other studies) as dividing point of BMI for analysis.
- All studies provided data with BMI divided into two subgroups (BMI ≥ 25 vs BMI < 25). Pooled analyses demonstrated overweight/obese women were less likely to achieve pCR after NACT when compared with women in the under-/normal weight group, OR 0.78 (95% CI: 0.68, 0.89). See Figure 1.

Figure 1: pCR rate in obesity & overweight group vs under-/normal weight group

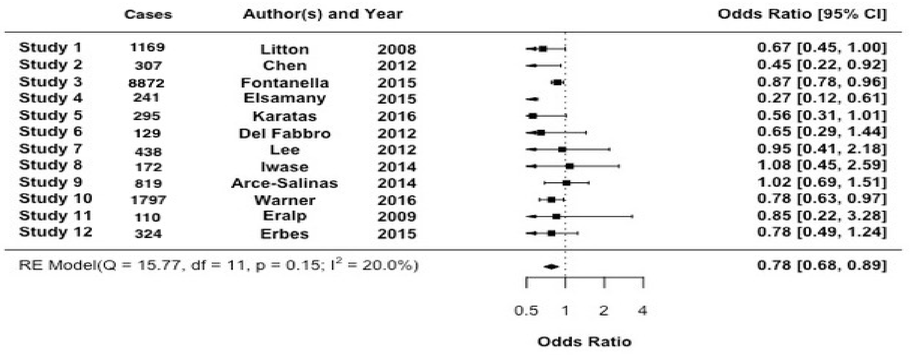


Figure 2: pCR rate in overweight group vs under-/normal weight group

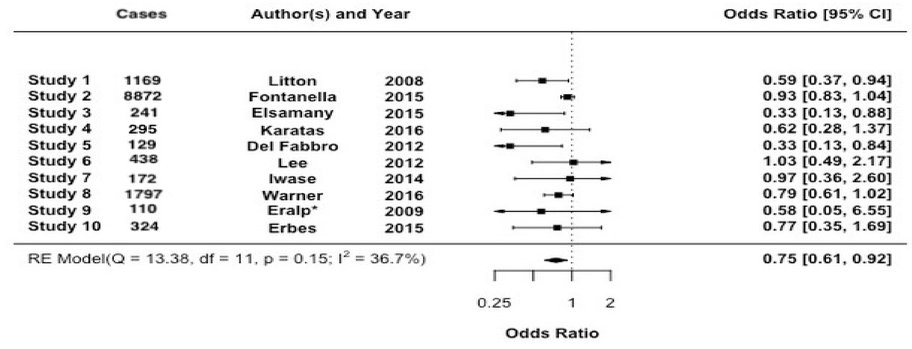
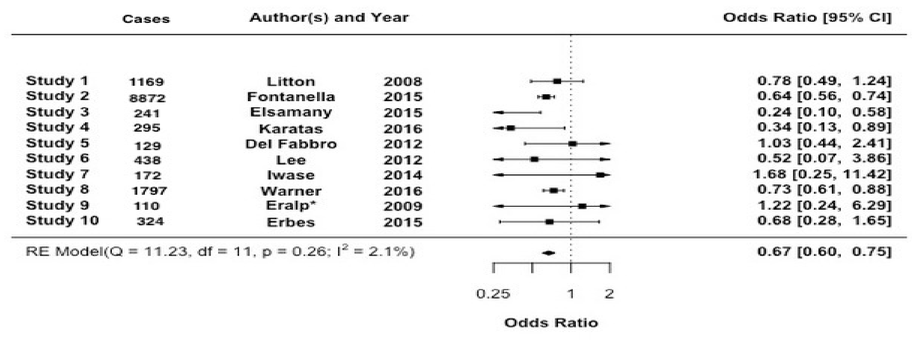


Figure 3: pCR rate in obese group vs under-/normal weight group



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RESULTS - continued

- 10 studies provided data with BMI divided into three groups, BMI < 25, 25 ≤ BMI < 30, and BMI ≥ 30. Pooled analyses showed, compared to under-/normal weight group, both overweight and obese groups were less likely to achieve pCR to NACT.
  - When comparing overweight group to under-/normal weight group, odd ratio was 0.75 (95% CI: 0.61, 0.92). Figure 2.
  - When compareing obese group to under-/normal weight group, odd ratio was 0.67 (95% CI: 0.60, 0.75). Figure 3.
- We were not able to perform pooled analyses of association between BMI and pCR in subtypes of breast cancer based on hormone receptor and HER 2 status, as only two studies provided these information and breast cancer subtypes were defined differently.

DISCUSSION

- In this meta-analysis, we demonstrated in more than 14000 patients that increasing BMI resulted in decreased pCR rate after neoadjuvant chemotherapy. Due to data limitation, we were not able to do pooled analyses of BMI to pCR rate based on breast cancer subtypes. As different subtypes of breast cancer have different biological behavior, the association of increasing BMI to decreasing pCR rate may not apply to all the breast cancer subtypes [4].
- Under-dosing of chemotherapy in overweight and obese breast cancer patients may be one of the underlying causes [5].
- High circulating estrogen and insulin in obese breast cancer patients may be related to worse outcome [6].

CONCLUSIONS

- Overweight and obese breast cancer patients had lower pCR rate to NACT compared to those with under-/normal weight.
- Further prospective studies may help to confirm this finding and to clarify underlying mechanisms.

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