


LEFT VENTRICULAR DIASTOLIC FUNCTION IN PREGNANT WOMEN SUFFERING FROM DYSPNEA

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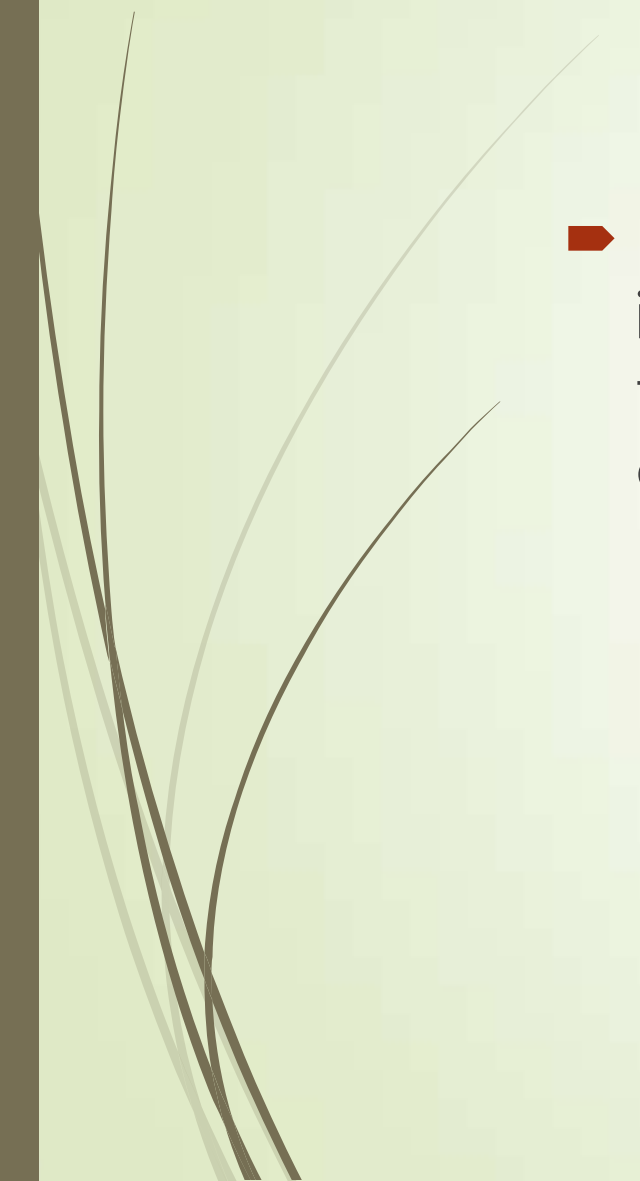


Background

- Dyspnea is a common symptom in healthy pregnant women in the absence of any cardiac or respiratory pathology.
 - Different theories were proposed to explain the mechanism of shortness of breath in pregnant women, however its precise mechanism remains unclear.
 - Some small retrospective studies described association between appearance of dyspnea and changes in LV diastolic function.
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Study design

- ▶ Prospective comparative echocardiographic evaluation including comprehensive assessment of LV diastolic function in healthy pregnant women with and without dyspnea.
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Inclusion criteria


- ▶ Normal pregnancy 22-36 weeks.
- ▶ Age \geq 18 years

Exclusion criteria

- ▶ Known cardiac or pulmonary pathology
- ▶ Smoking



Study protocol

- ▶ Participants scored their dyspnea using the MRC Breathlessness Scale.
 - ▶ Transthoracic echocardiography including comprehensive evaluation of LV diastolic function.
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The MRC Breathlessness Scale

Grade	Degree of breathlessness related to activities
1	Not troubled by breathlessness except on strenuous exercise
2	Short of breath when hurrying on the level or walking up a slight hill
3	Walks slower than most people on the level, stops after a mile or so, or stops after 15 minutes walking at own pace
4	Stops for breath after walking about 100 yds or after a few minutes on level ground
5	Too breathless to leave the house, or breathless when undressing

*From Chris Senton The MRC
Breathlessness Scale Occupational
Medicine 2008;58:226-227*



Two comparisons were conducted

- Women with MRC scale grade of 1 (women who didn't suffer from dyspnea) versus other groups of dyspnea;
 - Women with MRC grade of 1, 2 (no or mild dyspnea) versus women with a MRC grade of 3, 4 (more severe dyspnea).
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Echocardiographic parameters

- ▶ Standard transthoracic echocardiographic assessment.
- ▶ Diastology:
 - Mitral valve inflow assessment: E/A, E wave deceleration time
 - Pulmonary venous flow assessment (systolic, diastolic)
 - Tissue Doppler (TDI – mitral annulus (septal and free wall)).
 - Calculation of E/e ratio
 - Tei index

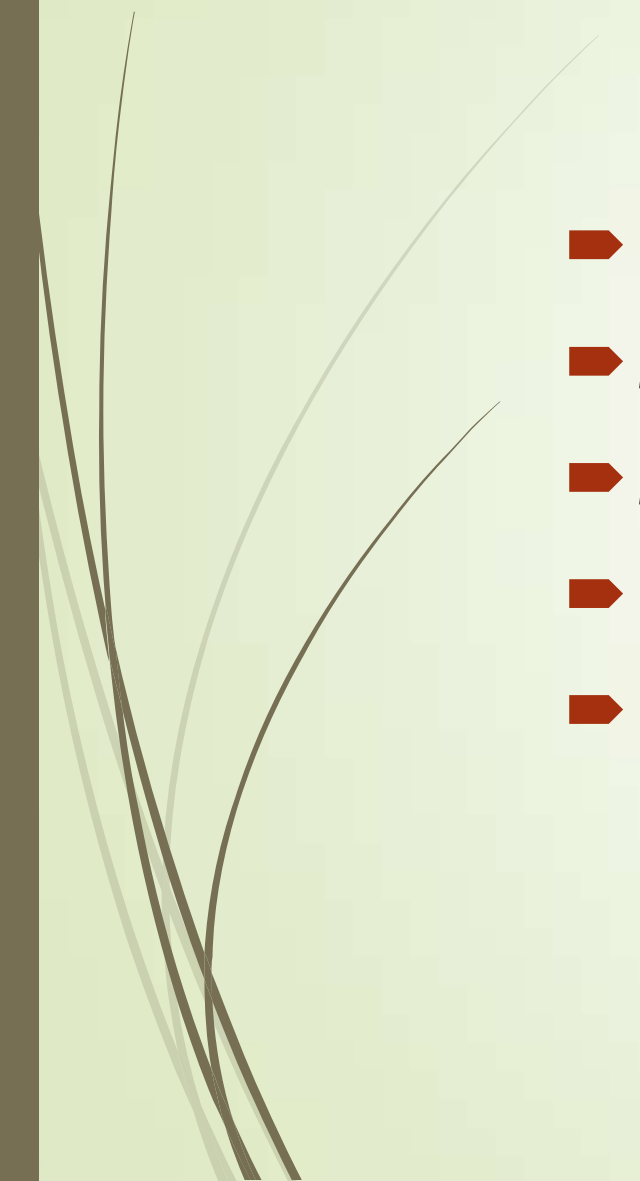


Statistics

- ANOVA test
 - P value < 0.05 was considered significant
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Results

- 154 participants
 - Mean age : 30.2 ± 5 years
 - Mean gestation: 26.6 ± 4.2 weeks
 - Parity: 2 ± 1.4
 - 87 women (57%) – multiparous
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MRC grade

MRC grade	Number	%
1	46	30
2	47	31
3	56	36
4	5	3

Grade 1 vs Grade 2,3,4

PARAMETER	Grade 1	Grade 2,3,4	P
Age, years	28.5±4.8	30.9±4.9	0.005
Parity	1.8±0.9	2.2±1.6	0.027
Gestation (weeks)	26.3±4.1	26.8±4.3	0.5
Height, cm	164±6	163±7	0.4
Weight, kg	71±11	73±12	0.4
BMI	26.6±4.1	27.4±4.1	0.2
HR (beats per minute)	82±12	80±12	0.3

Grade 1 vs Grade 2,3,4

Echocardiographic parameters			
Parameter	Grade1	Grade 2,3,4	P
Aorta, cm	2.7±0.2	2.7±0.3	0.7
LA, cm	3.8±0.4	3.8±0.4	0.6
LVEDD, cm	4.9±0.3	4.8±0.3	0.07
LVESD, cm	3.1±0.3	3.1±0.3	0.1
FS, %	0.4±0.1	0.4±0.1	0.7
IVS, cm	0.8±0.1	0.8±0.1	0.9
PW, cm	0.8±0.1	0.8±0.1	0.1
LA_area, cm ²	17.5±2	17.9±2.8	0.5
TAPSE, cm	2.6±0.3	2.6±0.4	0.8
PAP, mmHg	21±8	24±6	0.04
E wave, cm	95±17	89±20	0.09
A wave, cm	57±13	60±12	0.2
E/A	1.7±0.5	1.5±0.5	0.03
E wave DT, ms	155±29	163±34.	0.15

Tissue Doppler

PARAMETER	Grade 1	Grade2	P
eseptal, cm	13.6±2.5	11.9±2.5	< 0.001
E/e septal	7.2±1.7	7.6±2.1	0.2
elateral, cm	18.3±3	16.3±3.1	<0.001
E/e lateral	5.3±1.4	5.9±1.6	0.4
E/e mean	6.0±1.3	6.4±1.6	0.2
a septal, cm	9.9±2.2	9.7±2.2	0.8
a lateral, cm	8.7±1.8	9.5±2	0.02
Tei index	0.457±0.11	0.478±0.12	0.3

Grade 1-2 vs Grade 3-4

PARAMETER	Grade1-2	Grade 3-4	P
Age, years	29.1±4.3	31.7±5.4	0.002
Parity	1.9±1.1	2.3±1.8	0.09
Gestation, weeks	26.3±4.2	27.2±4.3	0.2
Height, cm	163.1±6.5	163 ±6.5	0.9
Weight, kg	70.8±11.5	74.4±10.6	0.05
BMI	26.6±4.1	28 ±3.8	0.04
HR	80±11.5	83±12.4	0.12

Grade 1-2 vs Grade 3-4 – echo parameters

PARAMETER	Grade 1-2	Grade 3-4	P
Aorta, cm	2.6±2.5	2.7±3.4	0.07
LA, cm	3.7±0.4	3.8±0.4	0.3
LVEDD, cm	4.9±0.3	4.8±0.4	0.3
LVESD, cm	3.1±0.3	3.1±0.3	0.7
FS, %	0.4±0.1	0.4±0.04	0.2
IVS, cm	0.8±0.1	0.8±0.1	0.5
PW, cm	0.8±0.1	0.8±0.2	0.11
LA_area, cm ²	17.6±2.3	18.±3.1	0.3
TAPSE, cm	2.6±0.4	2. 6±0.4	0. 4
PAP, mmHg	22.1±7.4	25±5.2	0.1
E wave, cm	95±20.3	84. 7±16.1	0.001
A wave, cm	58.6±12.9	60.6±12	0.3
E/A	1.7±0.5	1.5±0.4	0.004
E wave DT, ms	157±27.5	166.569±39.1	0.1
PVs, cm	55.5±11.3	55±10.8	0.8
PVd, cm	54.1±10.2	50.6±10.5	0.05
PVs/PVd	1.0±0.3	1.1±0.3	0.2

Grade 1-2 vs Grade 3-4 – TDI parameters

PARAMETER	Grade 1-2	Grade 3-4	P
e septal, cm	13 ±2.6	11.566±2.3	<0.001
E/e septal	7.5±2.2	7.430±2.2	0.9
e lateral, cm	17.7±3	15.502±3	<0.001
E/e lateral	5.5±1.5	5.5±1.6	0.8
E/e mean	6.3±1.5	6.3±1.5	0.9
a septal, cm	9.5±2	10.1±2.4	0.1
A lateral, cm	9.1±2	9.5±2	0.1
Tei index	0.5±0.1	0.5±0.1	0.4



Conclusions

- Dyspnea is a frequent symptom existing in about 70% of healthy pregnant women.
- Maternal age correlated significantly with presence and severity of dyspnea.
- Parity correlated significantly with presence of dyspnea.
- The presence of dyspnea was correlated with higher pulmonary pressure.
- The presence and the severity of dyspnea were correlated with **lower E wave amplitude , lower E/A ratio and lower e septal and e lateral amplitude measured by tissue Doppler**, therefore dyspnea during pregnancy seems to be associated with changes in left ventricular compliance.



Limitations of the study

- Subjective assessment of the dyspnea severity
- Relatively small sample size.

Additional investigation involving larger number of participants and using additional modalities (5-minute walk test, ergometry, CP test etc) seems to be warranted.