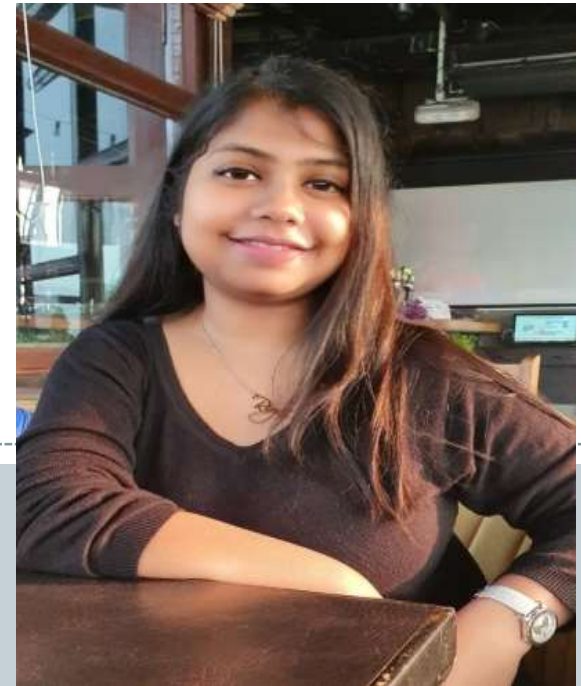




SUYASH MALOO



AHANA DAS

**RESEACH PROJECT ON:**

Development of brief with vibration therapy to prevent pressure ulcers among wheelchair ridden patients

**Faculty Mentor:** Mr.Bibekananda Banerjee

**Industry Mentor:** Dr.Shouvik Maity ( Medical Officer, S.S Hospital)

### OBJECTIVE:

To make the bottom wear (briefs) for both male and female , with vibrators fitted in it, which vibrates at a particular interval of time. The vibrators are to be made detachable to make the garment washable.

### BACKGROUND :

People in wheelchairs are limited in their mobility, sensory perception, and activity. These limitations can lead to increased temperature and moisture on the areas that are in contact with the wheelchair surface. These risk factors place wheelchair users at a higher risk for pressure injuries.

# RESEARCH METHODOLOGY

Primary and secondary survey to establish the problem



Pattern Development



Sourcing of raw materials, trims and accessories



Final Garment Testing



Development of Final Prototype



Development of 1<sup>st</sup> Prototype

# PRIMARY SURVEY

Primarily the survey was conducted in **IICP ( Indian Institute of Cerebral Palsy )**

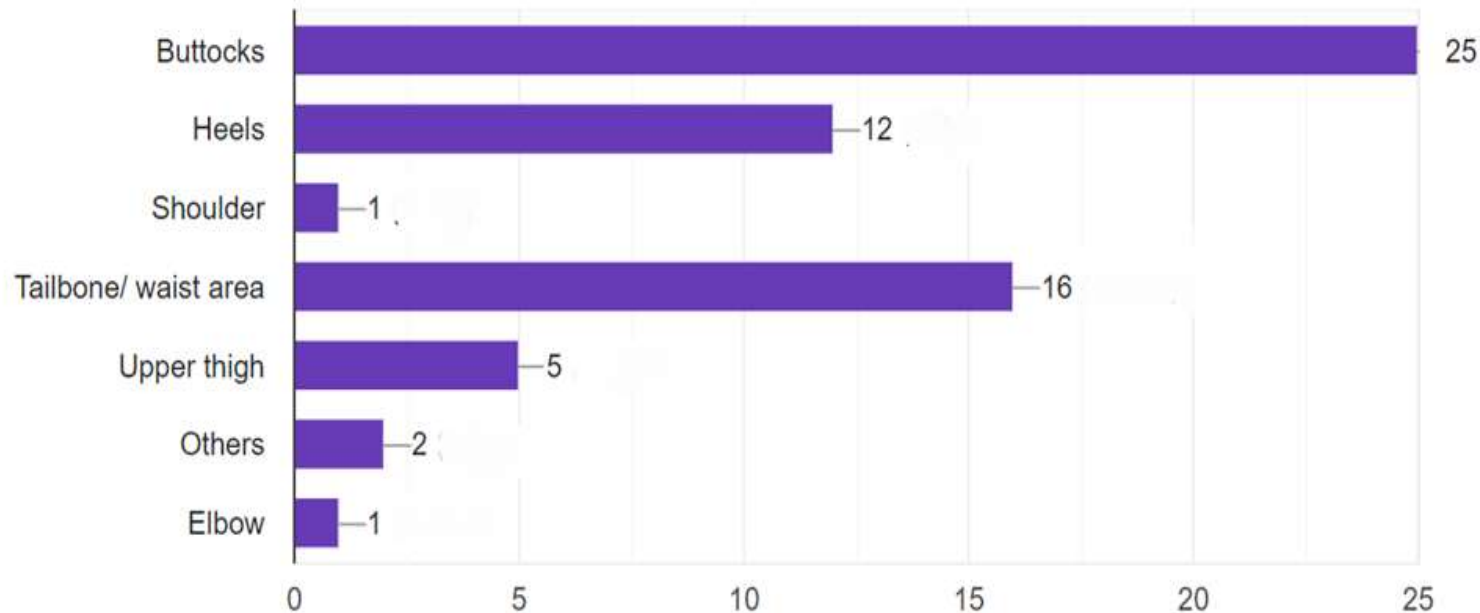
The age group for the survey was between 15 years- 60 years. The total population of wheelchair ridden patients in that institution



Data was collected through interviews and questionnaires. Since the target sample would not be able to participate in the interview directly because of their mental and physical health , their parents were called in , and after a presentation given by us , on the topic of discussion, the parents were asked several questions regarding their child's problem.

## FINDINGS OF THE SURVEY

On which area/areas do you have the pressure sore/sores at the time of the survey?



Total Number of pressure ulcers	62
Maximum no. of ulcers in buttocks	25

## LITERATURE REVIEW

In one the studies made in Kanazawa Medical University, Taiwan it was found that the patients were given vibrations (of frequency: 47 Hz; time: 10 seconds; force 5 gm ,amplitude modulation cycle: 15 seconds) for 15 minutes 3 times a day for up to 7 days to heal pressure ulcers. Other nursing treatments were the same for both experimental and control group.

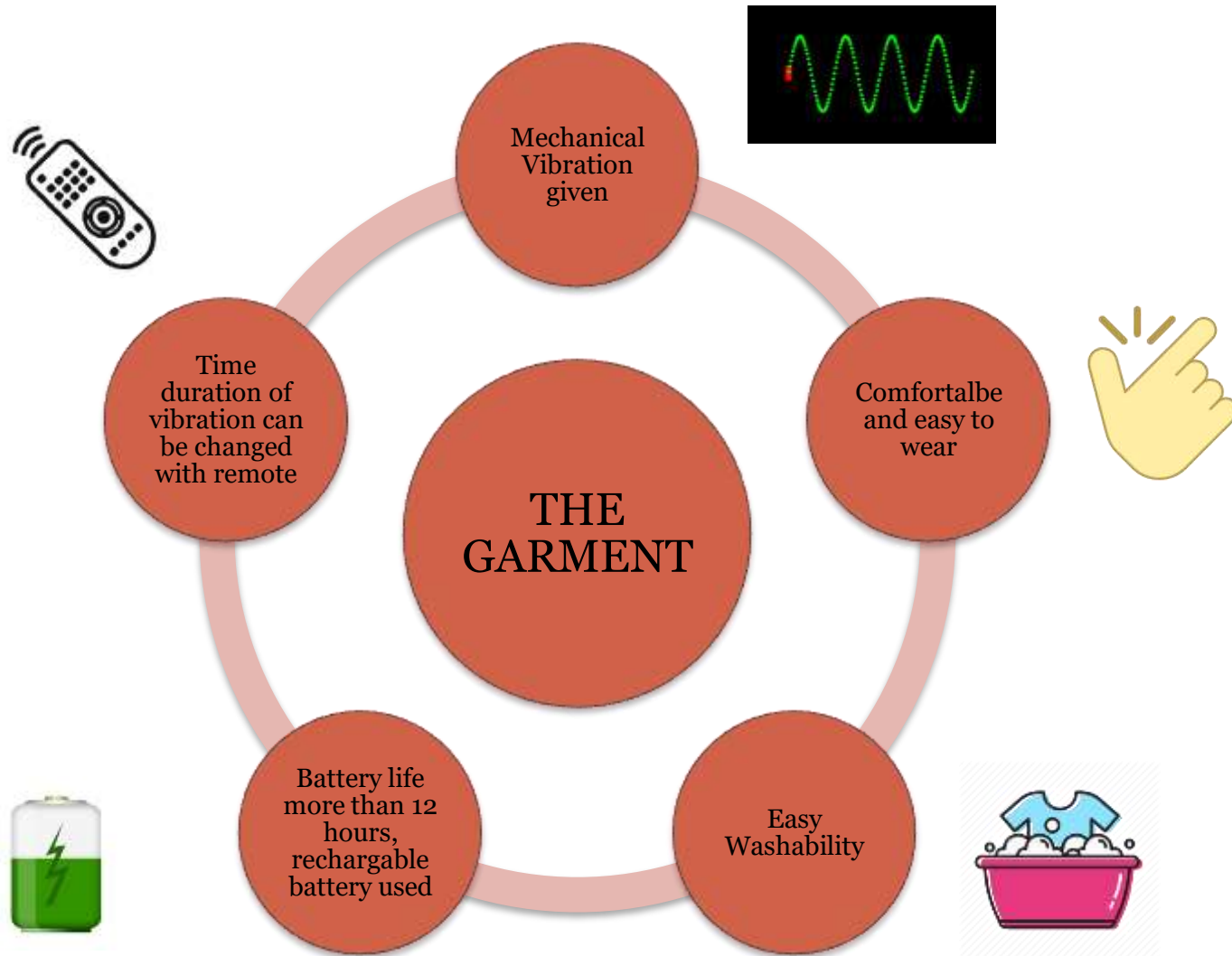
[Source: Journal on Advances in Skin and Wound care, July 2010]

Study carried out in	Kanazawa Medical College, Taiwan
Study carried out by	Junko Sugana, Midori Arashi and others
Tool used to heal ulcer	(RelaWave; Matsuda Micronics Corp, Chiba, Japan)
Time period of the study	7 days

## FINDINGS OF SURVEY

EXPERIMENTAL GROUP		CONTROL GROUP	
No. of patients	<b>16</b>	No. of patients	<b>15</b>
No. of ulcers at the beginning of the study	<b>20</b>	No. of ulcers at the beginning of the study	<b>21</b>
No. of ulcers healed	<b>8</b>	No. of ulcers healed	<b>2</b>
% of healed ulcers	<b>40%</b>	% of healed ulcers	<b>9.5%</b>

# PRODUCT DEVELOPMENT IDEA



# DESIGN OF THE BRIEF



**LADIES BRIEF  
(BACK )**



**LADIES BRIEF  
(FRONT)**



**GENTS BRIEF  
(BACK)**



**GENTS BRIEF  
(FRONT)**

## DESIGN OF THE BRIEF



10 Coin Vibrators with 9000 rpm each was attached to 2 pieces of velcro which in turn were attached in the pockets of the brief.

The assembled brief with the remote which has options for regulating the time of vibrations as per the requirement of the patient.



# TESTING OF THE GARMENT



**Objective :** To see the effectiveness of the briefs designed. The result will be calculated on the basis of visual assessment using the standard Braden Scale.

**Testing Procedure:**

1. The Braden scale score of the specimen sample will be noted in the buttock area.
2. The brief will be worn by the specimen sample for 7 days at a stretch for 12 hours.
3. The Braden scale score would be noted again and noted.

## ABOUT THE SAMPLE:

The name of the specimen sample is Misty Kundu. Her leg was amputated when she was 2 years. Now she is 5 years old. She goes to school in wheelchair, she is our sample for testing of the garment. She will be asked to wear the garment and Braden scale test will be done on her.

# FINDING OF THE TEST

**LEVABO**  
www.levabo.com

**Braden scale for predicting pressure sore risk**

Write score 1-4

	1. Completely Limited	2. Very Limited	3. Slightly Limited	4. No Impairment	
<b>A Sensory perception</b>	Unresponsive to pain, heat, cold, pressure, texture, etc. No verbal or non-verbal response to changes in environment.	Responds to pain, heat, cold, pressure, texture, etc. but only to changes in environment.	Responds to pain, heat, cold, pressure, texture, etc. but only to changes in environment.	Responds to pain, heat, cold, pressure, texture, etc. but only to changes in environment.	<b>3</b>
<b>B Moisture</b>	1. Completely Moist	2. Very Moist	3. Occasionally Moist	4. Rarely Moist	<b>2</b>
<b>C Activity</b>	1. Bedfast	2. Chairfast	3. Walks Occasionally	4. Walks Frequently	<b>2</b>
<b>D Mobility</b>	1. Completely Immobile	2. Very Limited	3. Slightly Limited	4. No Limitation	<b>2</b>
<b>E Nutrition</b>	1. Very Poor	2. Probably Inadequate	3. Adequate	4. Excellent	<b>3</b>
<b>F Friction &amp; shear</b>	1. Problem	2. Potential Problem	3. No Apparent Problem		<b>2</b>

A + B + C + D + E + F = Total score: **14**

Pressure sore risk

Low risk: = 9-12 Point  
High risk: = 13-14 Point  
Very high risk: = 15-16 Point

MS. MISTY KONDO  
DR. K. SARKAR  
22.06.2020

The Braden Scale score was 14 (moderate risk) before wearing the brief.

**LEVABO**  
www.levabo.com

**Braden scale for predicting pressure sore risk**

Write score 1-4

	1. Completely Limited	2. Very Limited	3. Slightly Limited	4. No Impairment	
<b>A Sensory perception</b>	Unresponsive to pain, heat, cold, pressure, texture, etc. No verbal or non-verbal response to changes in environment.	Responds to pain, heat, cold, pressure, texture, etc. but only to changes in environment.	Responds to pain, heat, cold, pressure, texture, etc. but only to changes in environment.	Responds to pain, heat, cold, pressure, texture, etc. but only to changes in environment.	<b>3</b>
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<b>F Friction &amp; shear</b>	1. Problem	2. Potential Problem	3. No Apparent Problem		<b>2</b>

A + B + C + D + E + F = Total score: **15**

Pressure sore risk

Low risk: = 9-12 Point  
High risk: = 13-14 Point  
Very high risk: = 15-16 Point

MS. MISTY KONDO  
DR. K. SARKAR  
22.06.2020

The Braden Scale score was 15 (low risk) after wearing the brief.

# SWOT ANALYSIS OF THE PRODUCT



- The brief would prevent the cause of pressure sores.
- It will be cheaper than the aids (vibrating mattress, air cushions) available in the market. The garment is made in an “INDEGINEOUS WAY”
- It will be a completely new product in the market as no such vibrating cushions , or briefs are available in the market.



- It might be bulky to wear.
- Testing of such brief will take a longer period of time



- Pressure sore is a common disease among bed ridden or wheelchair ridden patients. Hence, this brief would sell good in the market.



- Patients would take time to overcome the usage traditional aids which are available in the market.

# TIMELINE OF THE PROJECT

PHASE	DESCRIPTION OF WORK	TIME SPAN
1.	Surveying the doctors to understand the reasons, regions of pressure sores.	5 <sup>th</sup> Jan – 20 <sup>th</sup> Jan
2.	Surveying patients from various hospitals and disability centers for data collection.	7 <sup>th</sup> Jan – 12 <sup>th</sup> Feb
3.	Documentation of the survey	21 <sup>st</sup> Jan- 12 <sup>th</sup> Feb
4.	1 <sup>st</sup> Prototype designing of the brief	15 <sup>th</sup> Feb- 1 <sup>st</sup> March
5.	Studying the optimum range of frequency, amplitude and time of vibrations to be given.	10 <sup>th</sup> Feb- 21 <sup>st</sup> Feb
6.	Coding of the circuit	20 <sup>th</sup> Feb- 12 <sup>th</sup> March
7.	Making of timer and attaching with the vibrators	20 <sup>th</sup> Feb-12 <sup>th</sup> March
8.	2 <sup>nd</sup> Prototype designing of the brief	10 <sup>th</sup> March- 2 <sup>nd</sup> April
9.	Incorporating the vibrators in the brief	2 <sup>nd</sup> April- 20 <sup>th</sup> April
10.	Doing the necessary testing of the garment	12 <sup>th</sup> June – 28 <sup>th</sup> June
11.	Preparation of the document	12 <sup>th</sup> Jan – 25 <sup>th</sup> July

# REFERENCES

- <https://www.youtube.com/watch?v=kHep3NPVwjM&t=192s>
- <https://www.rehab.research.va.gov/jour/2016/535/pdf/JRRD-2015-07-0130.pdf>
- <https://www.statisticssolutions.com/using-chi-square-statistic-in-research/>
- Research Methodology by CV Kothari
- <https://www.statisticshowto.datasciencecentral.com/probability-and-statistics/z-score/>

Hospitals, Schools, Garment factories, and Electronic markets visited

- Indian Institute of Cerebral Palsy, Kolkata
- National Institute of Locomotor Disabilities
- Peerless Hospital
- SSKM
- Apollo Clinic.
- Kothari Hosieries
- R.D Knit Fab
- Haque Electronics

THANK YOU !