

PRUEBAS DE HIPÓTESIS NO PARAMÉTRICAS PARA LA COMPARACIÓN DE MEDIAS

César Gutiérrez Villafuerte

Sección de Estadística y Epidemiología

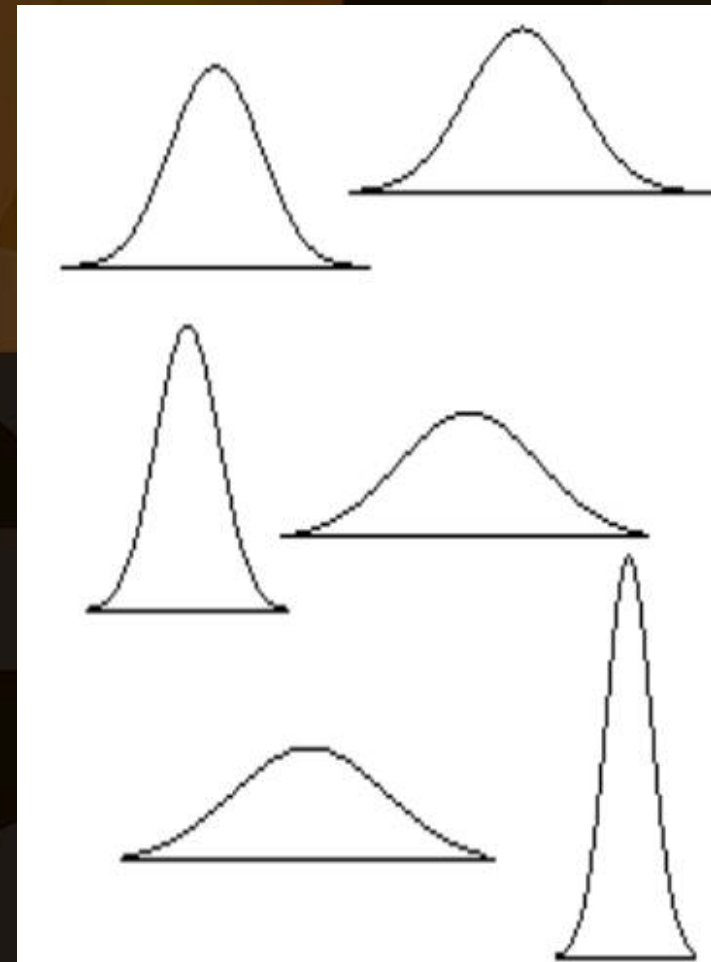
Facultad de Medicina – UNMSM

Lima, 18 de noviembre de 2005

Recordando de la clase de distribución normal...

Las Distribuciones Normales son una familia de distribuciones que tienen en general la misma forma. Son simétricas con valores que se concentran más hacia el medio que hacia los extremos (colas).

La distribución normal está completamente determinada por dos parámetros, su media μ y su desviación estándar σ .



Cualquier distribución normal puede transformarse en una distribución normal estándar mediante la fórmula:

$$Z = \frac{X - \mu}{\sigma}$$

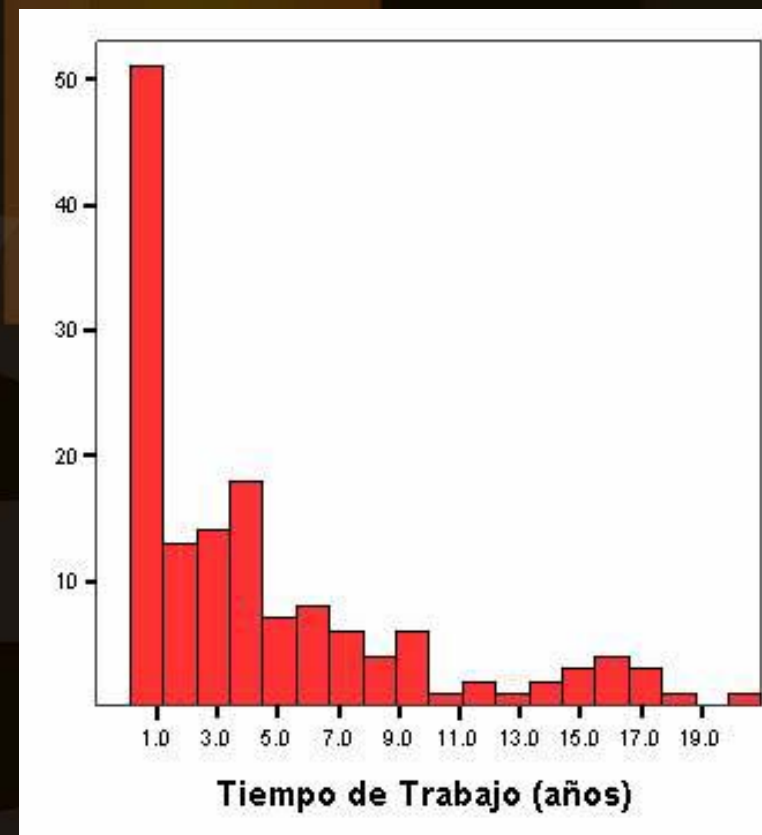
Donde X es un valor de la distribución normal original, μ es la media de la distribución normal original y σ es la desviación estándar de la distribución normal original.

La distribución normal estándar es llamada también distribución Z . Un valor Z siempre refleja el número de desviaciones estándar por encima o por debajo de la media que se encuentra un valor en particular.

Al aplicar la fórmula, siempre se tendrá como resultado una variable transformada con $\mu=0$ y $\sigma=1$.

Sin embargo, la forma de la distribución no cambiará con la transformación.

Si la variable no presenta una distribución normal, tampoco la transformación.



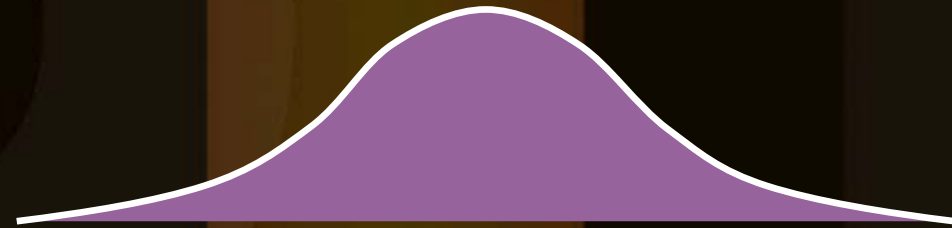
¿Cómo evaluar si una distribución es normal?

- Asimetría y curtosis.
- Mediante gráficos (histograma, tallo y hojas, cajas, Q-Q).
- Prueba de Kolmogorov-Smirnof.

Variable	Estadística	Valor
Edad	Media	39.27
	Desviación estándar	9.70
	Asimetría	-0.16
	Curtosis	-0.60
Tiempo de servicio	Media	5.92
	Desviación estándar	5.65
	Asimetría	0.84
	Curtosis	-0.57



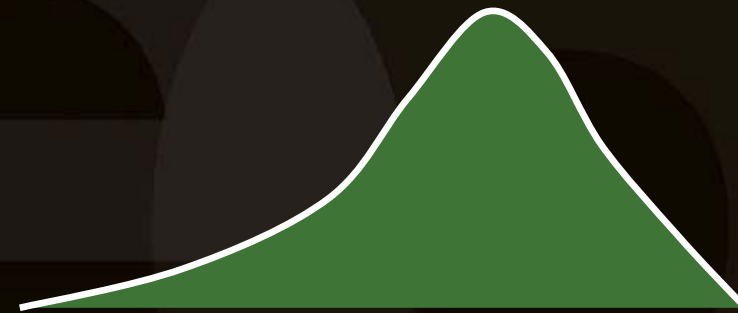
Curtosis > 0



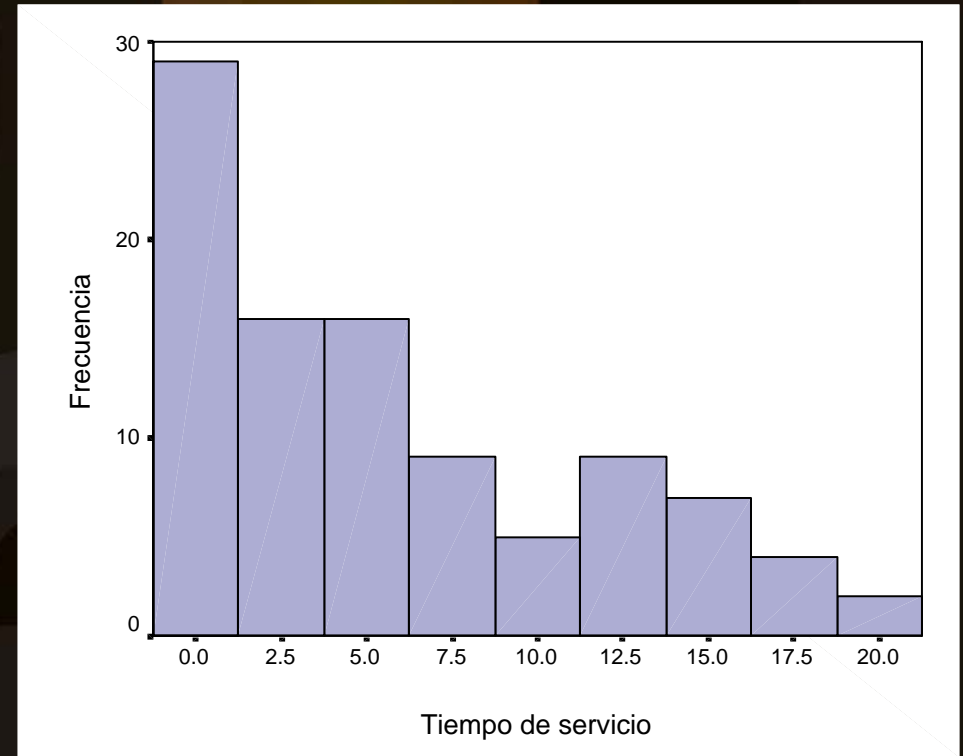
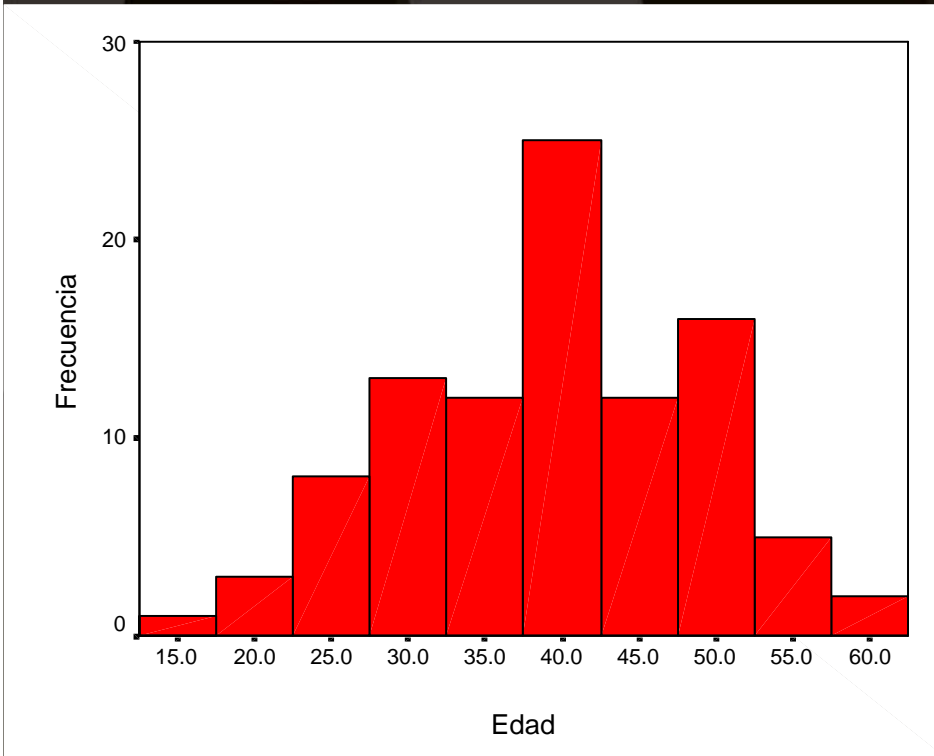
Curtosis < 0



Asimetría > 0



Asimetría < 0



Edad Stem-and-Leaf Plot

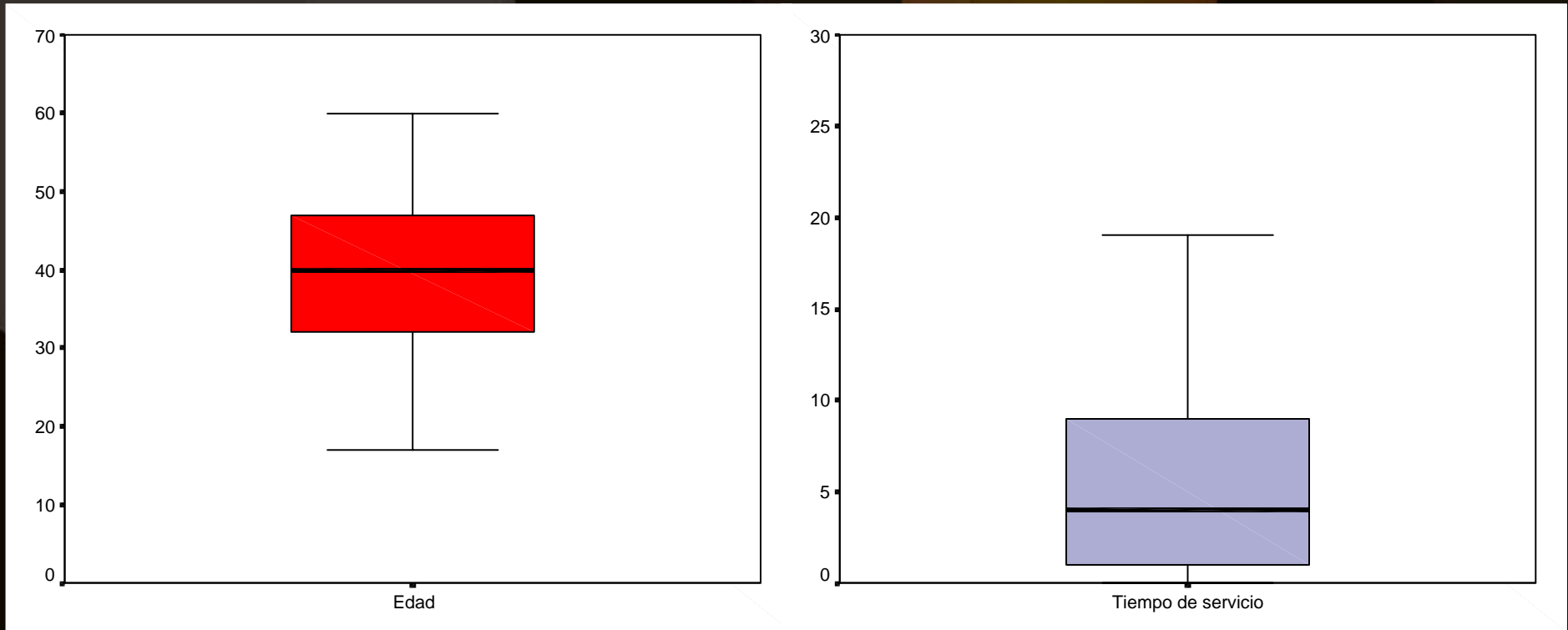
Frequency	Stem &	Leaf
2.00	1 .	78
5.00	2 .	02334
10.00	2 .	5666688889
15.00	3 .	00111122333444
13.00	3 .	5566788888899
23.00	4 .	00000011111222222333444
12.00	4 .	556677899999
14.00	5 .	00000122223344
2.00	5 .	69
1.00	6 .	0

Stem width: 10
Each leaf: 1 case(s)

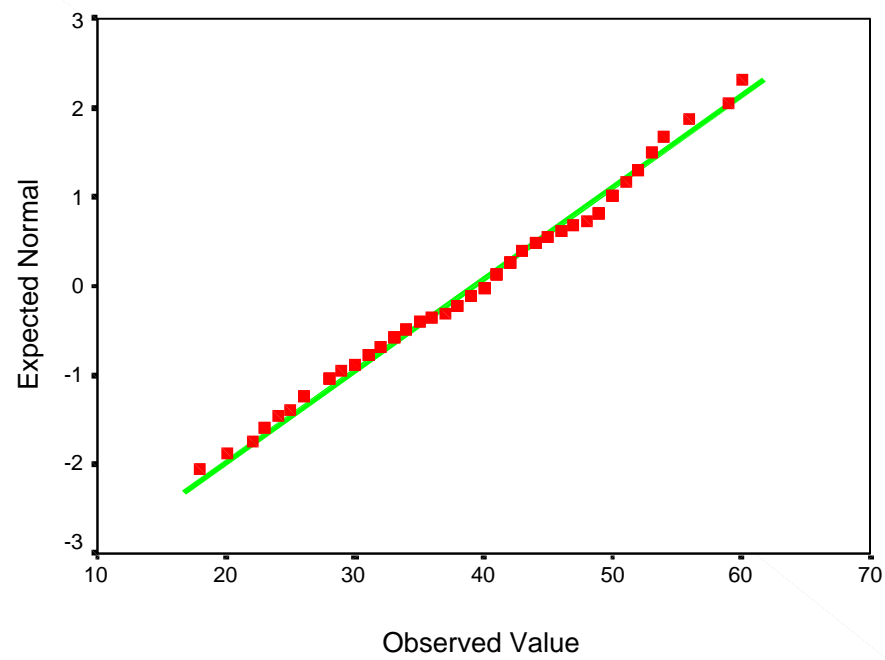
Tiempo de servicio Stem-and-Leaf Plot

Frequency	Stem &	Leaf
13.00	0 .	00000000000000
16.00	1 .	0000000000000000
8.00	2 .	00000000
8.00	3 .	00000000
9.00	4 .	000000000
3.00	5 .	000
4.00	6 .	0000
6.00	7 .	000000
3.00	8 .	000
3.00	9 .	000
2.00	10 .	00
.00	11 .	
1.00	12 .	0
8.00	13 .	00000000
2.00	14 .	00
1.00	15 .	0
4.00	16 .	0000
3.00	17 .	000
1.00	18 .	0
2.00	19 .	00

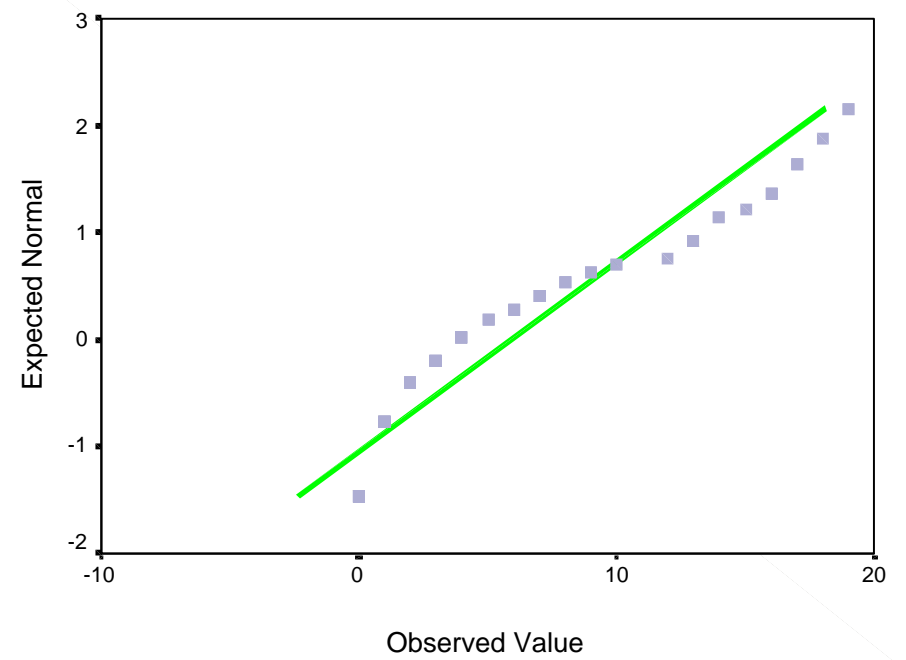
Stem width: 1
Each leaf: 1 case(s)



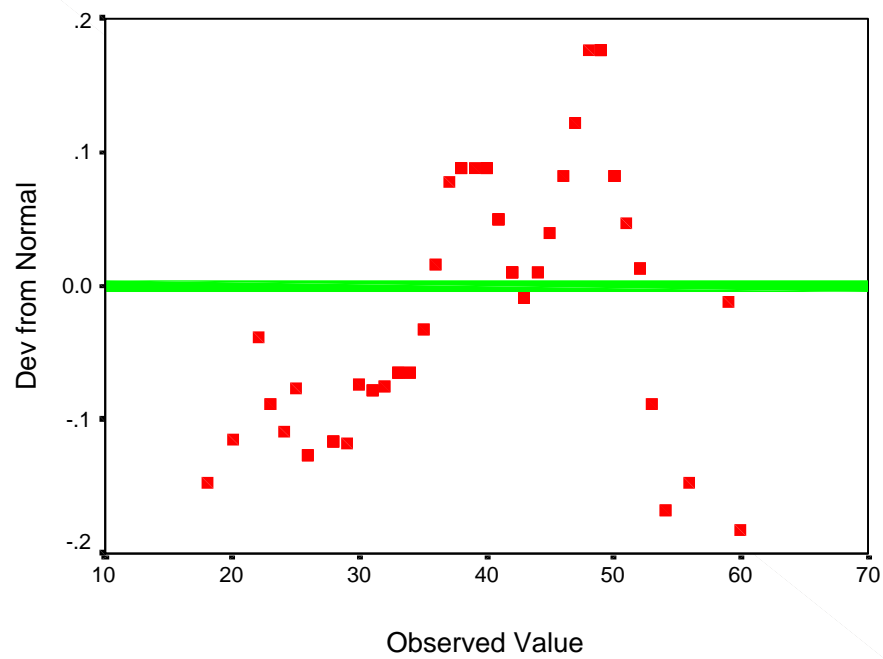
Normal Q-Q Plot of Edad



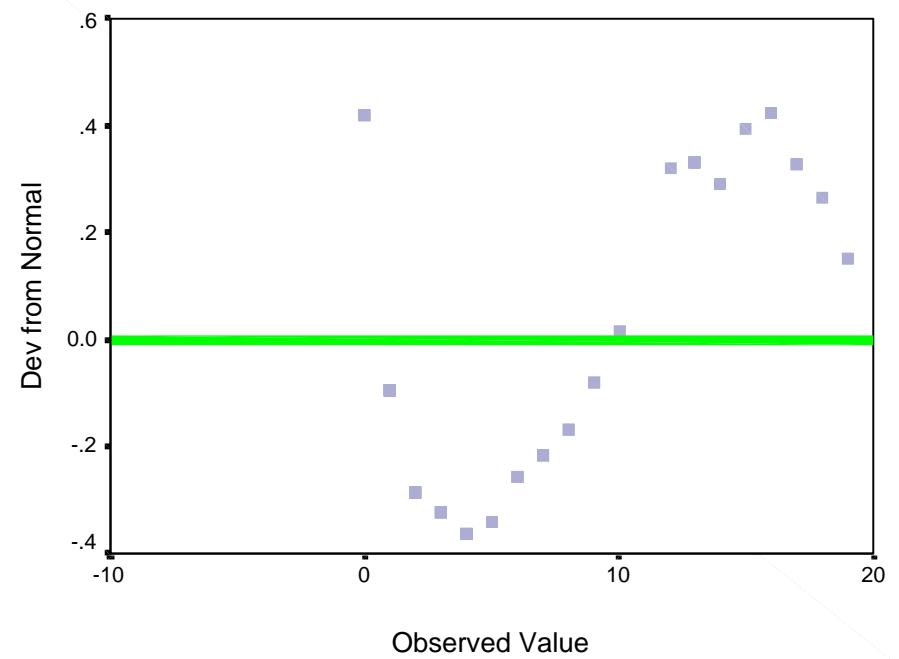
Normal Q-Q Plot of Tiempo de servicio



Detrended Normal Q-Q Plot of Edad



Detrended Normal Q-Q Plot of T de servicio



Prueba de Normalidad

Kolmogorov-Smirnov

	Estadístico de prueba	g. l.	valor p
Edad	0.07	97	0.20
Tiempo de servicio	0.19	97	0.00

- La variable *edad* sigue una distribución normal, por lo su análisis puede realizarse con pruebas de hipótesis paramétricas.
- Sin embargo, la variable *tiempo de servicio* no sigue una distribución normal.
- ¿Cómo analizar entonces la variable *tiempo de servicio*?

Pruebas de hipótesis No Paramétricas

- Al realizar una investigación, los datos recolectados no van a tener una distribución normal necesariamente.
- En estos casos, no se cumpliría con los supuestos para trabajar con pruebas de hipótesis Paramétricas.
- Se trabaja entonces con las pruebas No Paramétricas (llamadas también de libre distribución).

¿Cuándo aplicar una prueba de hipótesis No Paramétrica?

- Una prueba no paramétrica se aplica cuando los datos de la muestra:
 1. No siguen una distribución normal,
 2. No es posible aceptar las suposiciones de la estadística paramétrica, o
 3. Tienen una escala de medición que no permite realizar operaciones aritméticas

Rangos

- El rango es un número asignado a una observación teniendo en cuenta su importancia relativa o jerarquía respecto a los demás datos.

Dato (nota)	05	06	08	10	11	12	15	17	20
Rango	1	2	3	4	5	6	7	8	9
Dato (Hb)	7.5	8.8	9.3	10.4	11.7	12.1	13.0	14.5	15.6
Rango	1	2	3	4	5	6	7	8	9

Etapas en la Prueba de Hipótesis

1. Evaluar los datos.
2. Revisar las suposiciones (normalidad de la distribución).
3. Formular las hipótesis estadísticas (nula y alternativa).
4. Seleccionar la prueba estadística.
5. Formular la regla de decisión.
6. Calcular la estadística de prueba.
7. Formular la decisión estadística (rechazar o no H_0).
8. Conclusión.
9. Valor p.

Pruebas No Paramétricas para comparar medias

- Comparación de dos medidas (muestras independientes).
- Comparación de dos medias (datos pareados).
- Comparación de tres o más medias (muestras independientes).

Comparación de dos medidas (muestras independientes)

- Se realiza a través de la prueba U de Mann-Whitney.
- La prueba de hipótesis, más que comparar medias, plantea la comparación de medianas.
- La escala de medición es por lo menos ordinal.
- Las dos muestras que se utilizan para el análisis son independientes.

Prueba U de Mann-Whitney

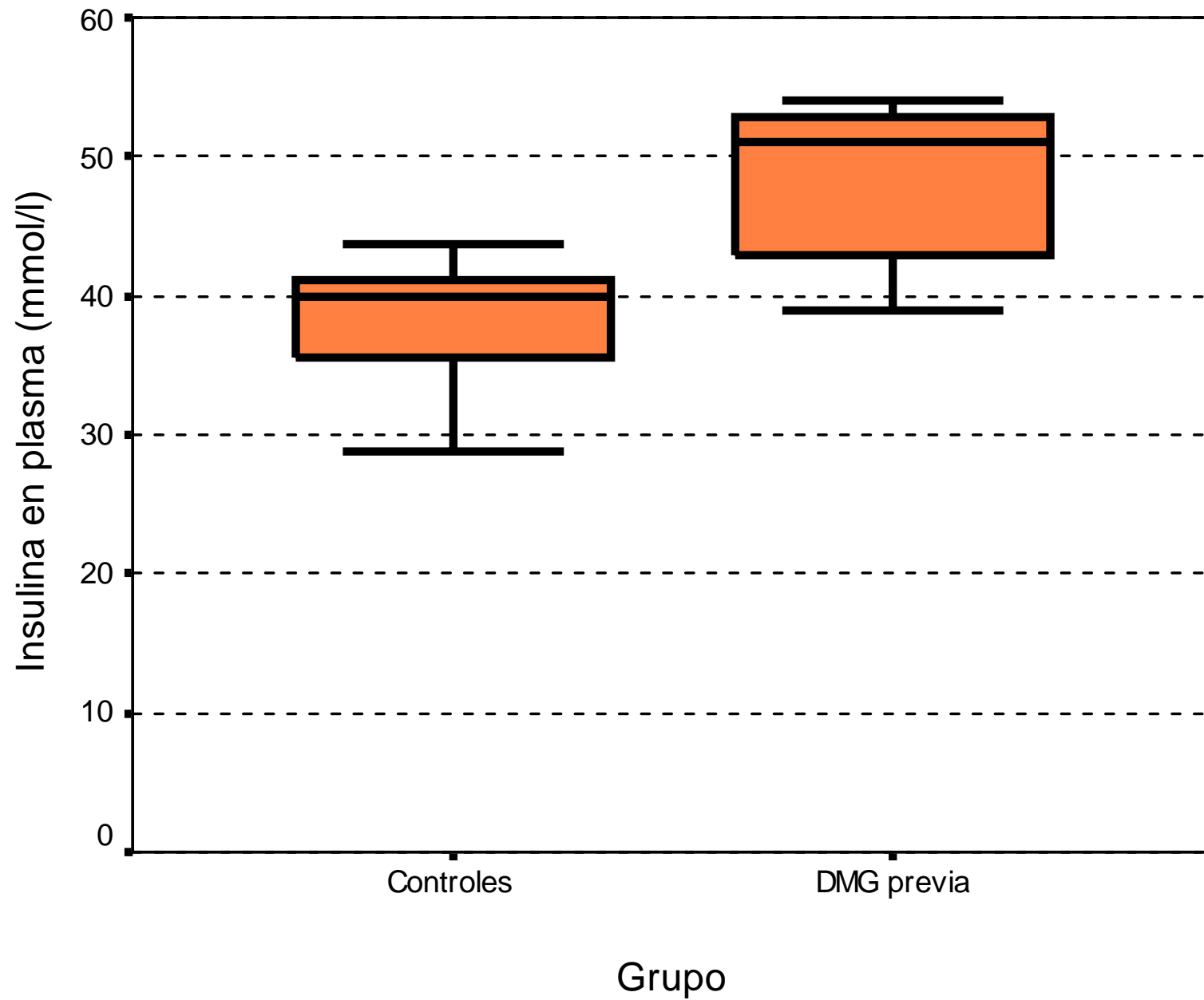
- Un estudio tuvo por objetivo comparar los niveles de insulina entre gestantes con antecedente de diabetes gestacional (DMG) y un grupo control. Para tal fin se seleccionaron a 12 gestantes con el antecedente de DMG y 11 controles.
- ¿Qué prueba de hipótesis emplearía en esta investigación?

Nivel de insulina (mmol/l)

Controles	DMG Previa
39.50	51.00
40.00	52.50
31.25	53.60
41.00	41.25
41.25	51.00
38.75	52.00
40.00	47.00
28.80	53.00
42.00	39.00
32.50	42.00
43.75	54.00
	43.75

Descriptives

Grupo		Statistic	
Insulina en plasma (mmol/l)	Controles	Mean	38.0727
		Median	40.0000
		Variance	23.983
		Std. Deviation	4.89726
		Minimum	28.80
		Maximum	43.75
		Range	14.95
		Skewness	-1.009
		Kurtosis	-.339
		DMG previa	
Median	51.0000		
Variance	29.712		
Std. Deviation	5.45089		
Minimum	39.00		
Maximum	54.00		
Range	15.00		
Skewness	-.633		
Kurtosis	-1.347		



Tests of Normality

		Kolmogorov-Smirnov		
		Statistic	df	Sig.
Insulina en plasma (mmol/l)	Controles	.282	11	.014
	DMG previa	.270	12	.016



- Output
 - NPar Tests
 - Notes
 - Mann-Whitney Test
 - Title
 - Ranks
 - Test Statistics

Mann-Whitney Test

Ranks

	Grupo	N	Mean Rank	Sum of Ranks
Insulina en plasma (mmol/l)	Controles	11	7.05	77.50
	DMG previa	12	16.54	198.50
	Total	23		

Test Statistics^b

	Insulina en plasma (mmol/l)
Mann-Whitney U	11.500
Z	-3.358
Asymp. Sig. (2-tailed)	.001

b. Grouping Variable: Grupo

Primary research

Emergency airway management by intensive care unit nurses with the intubating laryngeal mask airway and the laryngeal tube

Volker Döriges*, Volker Wenzel†, Eicke Neubert* and Peter Schmucker*

*University Hospital of Lübeck, Lübeck, Germany, and †The Leopold-Franzens University of Innsbruck, Innsbruck, Austria

ed
PERU

Synopsis

Introduction: In-hospital cardiopulmonary resuscitation (CPR) response teams may include nurses because of shortages of physicians. Hence, ventilation-associated complications may occur if nurses who are involved in such teams have no extensive experience in emergency airway management.

Rescuers who are unable or untrained to intubate may perform bag–valve–mask ventilation during CPR [1]. In order to reduce the risk of stomach inflation, the European Resuscitation Council recommends a tidal volume of 0.5 l for bag–valve–mask ventilation of a nonintubated cardiac arrest victim, as compared with the 0.8–1.2 l as previously recommended by the American Heart Association [1,2].

It was shown [3–8] that a LMA and combitube (Tyco Healthcare, Argyle, NY, USA) may be an alternative to bag–valve–mask ventilation. However, a possible limiting feature of the laryngeal mask is the risk of aspiration [9], and the complex combitube requires extensive instruction and training to ensure correct placement within an acceptable time [10]. Therefore, the ILMA and the laryngeal tube (Fig. 1) have recently been developed [11,12].

The present study assesses lung ventilation and gastric inflation with the ILMA and the laryngeal tube in a bench model, when performed by intensive care unit (ICU) nurses. Furthermore, it was investigated whether a tidal volume of 0.5 l, rather than 0.8–1.2 l, is beneficial in reducing the risk of gastric inflation.

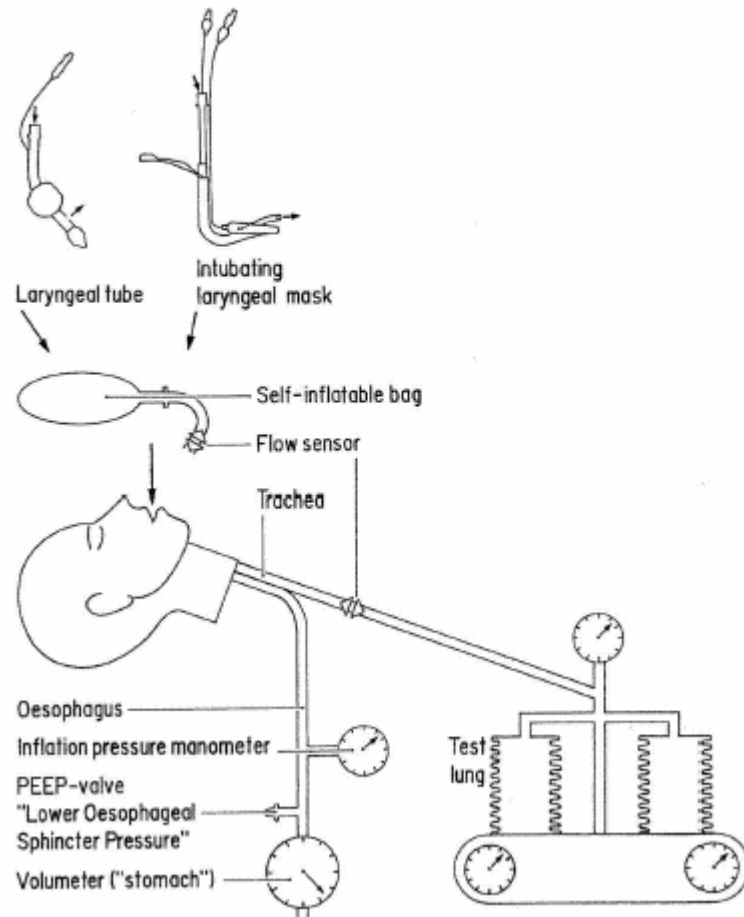
Methods: A previously described bench model (lung compliance 50 ml/cmH₂O [13]; airway resistance 16 cmH₂O/l per s [14]; lower oesophageal sphincter pressure 6 cmH₂O [15]) simulating an unintubated cardiac arrest patient [3,4] was used to compare the effects of ventilation using ILMA and laryngeal tube.

All 20 nurses were instructed in the use of the ILMA and the laryngeal tube before the study. The participants then used each ventilatory device with two self-inflating bags (maximum volume 1500 and 1100 ml, respectively; Dräger, Lübeck, Germany) in a randomized order for a 2-min attempt to achieve adequate ventilation. The time to attain a tidal lung volume exceeding 200 ml was recorded. If this volume could not be achieved within 180 s, then it was deemed that the attempt at ventilation had failed. The time to insertion of the endotracheal

CPR = cardiopulmonary resuscitation; ICU = intensive care unit; ILMA = intubating laryngeal mask airway; PEEP = positive end-expiratory pressure.

Figure 3

Airway Devices:



Modification of a previously described bench model of positive-pressure ventilation with an unprotected airway [3,33]. The upper airway was provided by a new intubation manikin head. The tracheal outlet of the manikin head was connected to a mechanical test lung (lung compliance 50 ml/cmH₂O; airway resistance 16 cmH₂O/l per s). The oesophageal outlet of the manikin head was connected to an adjustable PEEP valve, which represented lower oesophageal sphincter pressure. A second outlet from the PEEP valve was connected to a paediatric pneumotachometer in order to record oesophageal peak pressure and gastric inflation. A flow sensor was inserted between the self-inflating bag and the airway device under investigation; another flow sensor was inserted into the simulated trachea. The flow sensors were connected to respiratory monitors in order to measure ventilation variables.

Statistical methods

Statistical analysis was carried out using the Statistical Package for the Social Sciences (SPSS, Chicago, Illinois, USA). $P < 0.05$ was considered statistically significant. A Kolmogorov–Smirnov adjustment test was performed to assess the distribution of the data. The Mann–Whitney U-test was used to compare the two self-inflating bags.

Table 1

Tidal lung and tidal oesophageal volume, airway and oesophageal peak pressure for the intubating laryngeal mask and laryngeal tube and both self inflating bags

Laryngeal tube/ mask characteristics	Peak P _{aw} (cmH ₂ O)	Peak P _{oesoph} (cmH ₂ O)	VT lung (ml)	VT oesophagus (ml)
ILMA (before endotracheal intubation)				
1100 ml bag	18 ± 2	0	674 ± 27	0
1500 ml bag	21 ± 2	0	790 ± 33*	0
ILMA (after endotracheal intubation)				
1100 ml bag	25 ± 2*	0	623 ± 26	0
1500 ml bag	30 ± 3	0	741 ± 33*	0
Laryngeal tube				
1100 ml bag	25 ± 2	0.1 ± 0.1	666 ± 31	0
1500 ml bag	27 ± 2	0.4 ± 0.4	752 ± 46	0

Data are expressed as mean ± standard error of the mean. P_{aw}, airway pressure; P_{oesoph}, oesophageal pressure; VT, tidal volume. *P < 0.05, versus 1100 ml self-inflating bag.

In conclusion, the newly developed medium-size self-inflating bag may be an option for maintaining sufficient ventilation and for reducing the risk of gastric inflation when ventilating an unprotected airway. Both the ILMA and laryngeal tube proved to be valid alternatives for emergency airway management in the experimental model studied here.

Comparación de dos medidas (datos pareados)

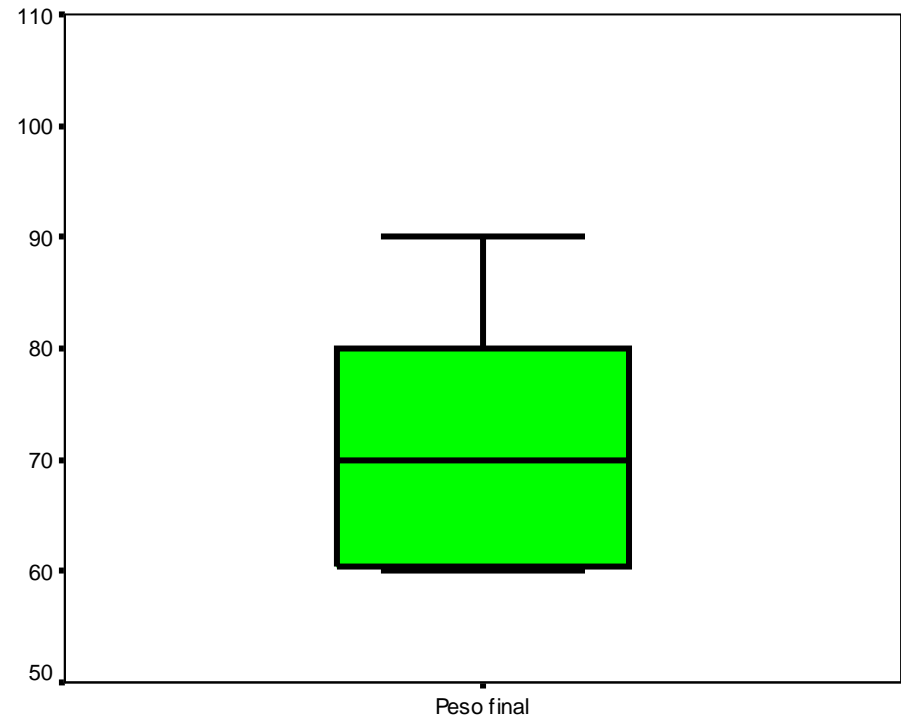
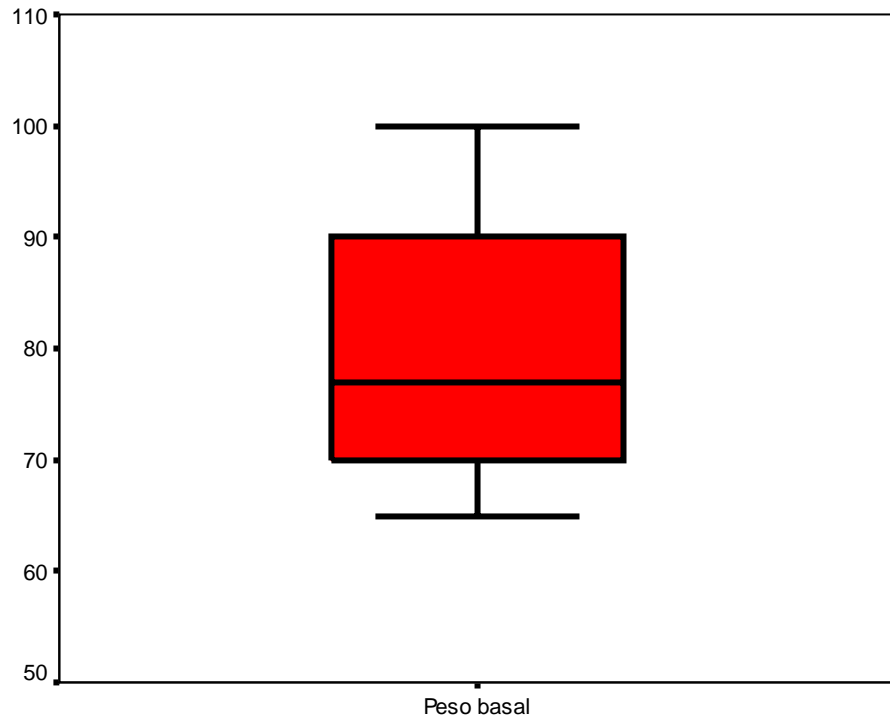
- Se realiza a través de la prueba de Wilcoxon.
- Se utiliza para evaluar la hipótesis nula que indica que en la población estudiada la mediana de las diferencias entre pares es igual a 0.

Prueba de Wilcoxon

- Se evaluó la reducción de peso luego de seguir un régimen de dieta y ejercicio en 20 personas con sobrepeso u obesidad.
- ¿Qué prueba de hipótesis emplearía en esta investigación?

Descriptives

		Statistic
Peso basal	Mean	79.1500
	Median	77.0000
	Variance	105.503
	Std. Deviation	10.27145
	Minimum	65.00
	Maximum	100.00
	Skewness	.611
	Kurtosis	-.788
Peso final	Mean	70.30
	Median	70.00
	Variance	94.116
	Std. Deviation	9.701
	Minimum	60
	Maximum	90
	Skewness	.636
	Kurtosis	-.666



Tests of Normality

	Kolmogorov-Smirnov		
	Statistic	df	Sig.
Peso basal	.195	20	.046
Peso final	.212	20	.019



- Output
 - NPar Tests
 - Notes
 - Wilcoxon Signed Ranks Test
 - Title
 - Ranks
 - Test Statistics

Wilcoxon Signed Ranks Test

		Ranks		
		N	Mean Rank	Sum of Ranks
Peso basal - Peso final	Negative Ranks	0 ^a	.00	.00
	Positive Ranks	20 ^b	10.50	210.00
	Ties	0 ^c		
	Total	20		

a. Peso basal < Peso final
b. Peso basal > Peso final
c. Peso final = Peso basal

Test Statistics^b

	Peso basal - Peso final
Z	-3.956 ^a
Asymp. Sig. (2-tailed)	.000

- a. Based on negative ranks.
- b. Wilcoxon Signed Ranks Test

ISSUES AND INNOVATIONS IN NURSING PRACTICE

Efficacy of swallowing training for residents following stroke

LIN L.C., WANG S.C., CHEN S.H., WANG T.G., CHEN M.Y. & WU S.C.
(2003) *Journal of Advanced Nursing* 44(5), 469–478

Efficacy of swallowing training for residents following stroke

Background. The presence of dysphagia is associated with an increased risk of mortality, malnutrition, dehydration, compromised pulmonary function, and disability. Appropriate swallowing training can establish optimal nutritional status and eliminate or reduce the risk of developing medical complications associated with swallowing impairment.

Aim(s) of the study. The aim of this study was to examine the functional swallowing and nutritional outcomes of swallowing training in institutionalized stroke residents with dysphagia.

Design and methods. A quasi-experimental parallel cluster design was used. Seven institutions with similar bed sizes were selected. All subjects in the experimental group received a structured swallowing training programme. The subjects in the experimental group ($n = 40$) received 30 minutes of swallowing training each day for 6 days per week for 8 weeks. The control group ($n = 21$) did not receive any training.

Instruments

Instruments included swallowing training outcome indicators. In addition to demographic data, the SPMSQ and Barthel Index of daily activities were used as descriptors of the subjects before training. Measurements were made at the same time with respondents in the control group. The outcomes were assessed using the following measures: (1) a timed swallowing test, (2) signs and/or symptoms on a swallowing questionnaire, (3) neurological examination, (4) choking frequency during meal, (5) blood examination for haemoglobin and albumin, (6) mid-arm circumference, (7) body mass index (BMI), and (8) body weight.

Data analysis

Data were analysed using chi-square, Wilcoxon, and Mann-Whitney 'U' tests. As this study was concerned with whether the outcomes of the experimental group were more favourable than those of the control group, a one tailed *P*-value of < 0.05 was used to determine significance.

were compared. The Wilcoxon test was used to determine the difference of swallowing and nutritional status pre- and post-test. The outcome criteria included swallowing function and nutritional status and are shown in Table 2. In timed

Table 2 Comparison of swallowing and nutritional status pre- and post-training between experimental and control groups

	Experimental group (<i>n</i> = 35)		Z-value	P-value	Control group (<i>n</i> = 14)		Z-value	P-value
	Mean	SD			Mean	SD		
Volume per second								
Pretest	4.64	3.95	-3.018	0.002	9.00	6.00	-1.224	0.111
Post-test	6.22	4.63			7.61	4.90		
Volume per swallow								
Pretest	12.80	6.61	-2.506	0.006	16.18	7.03	-1.224	0.111
Post-test	16.95	10.51			14.59	5.90		
Coughing/choking at timed swallowing test								
Pretest	0.50	0.51	-2.138	0.017	0.29	0.47	0.000	0.500
Post-test	0.26	0.45			0.29	0.47		
Swallowing questionnaire								
Pretest	0.97	2.08	-1.712	0.045	0.64	1.28	-1.414	0.079
Post-test	0.46	0.89			0.93	1.44		
Neurological examination								
Pretest	3.56	2.62	-4.418	0.000	3.89	3.29	-1.025	0.153
Post-test	1.74	2.16			3.39	3.02		

Table 3 Comparison of swallowing and nutritional status pre- and post-swallowing training between experimental and control groups ($n = 49$)

	Experimental group ($n = 35$)		Control group ($n = 14$)		Mann-Whitney <i>U</i> test (Z-value)	P-value
	Mean _d	SD	Mean _d	SD		
Volume per second	1.58	3.84	-1.39	4.29	-2.382	0.009
Volume per swallow	4.15	8.78	-1.60	8.71	-2.417	0.008
Coughing/choking at timed swallowing test	-0.24	0.61	0.00	0.39	-1.422	0.078
Swallowing questionnaire	-0.51	1.62	0.29	0.73	-1.515	0.065
Neurological examination	-1.83	1.80	-0.50	2.10	-1.854	0.032
Coughing/choking at meals	-5.29	8.59	2.43	6.84	-3.664	0.000
Albumin	0.03	0.32	-0.11	0.27	-1.362	0.087
Haemoglobin	-0.25	1.04	-0.14	0.75	-0.055	0.478
Mid-arm circumference	0.68	1.82	-0.85	2.13	-1.883	0.030
BMI	0.48	0.82	0.20	0.48	-1.508	0.066
Body weight	0.77	1.36	0.28	0.65	-1.695	0.045

Note: Mean_d = Mean_{post-training} - Mean_{pretraining}

What is already known about this topic

- Appropriate swallowing training can reduce the frequency of coughing or choking, and increase the swallowing rate in patients with swallowing impairment.
- Appropriate swallowing training among patients with stroke can aid in establishing optimal nutritional status and eliminate or reduce the risk of associated complications.

What is this paper adds

- Swallowing therapy in stroke patients with chronic dysphagia is effective in improving this function.
- Nurses can be trained to implement swallowing therapy for patients after stroke.
- Swallowing function and nutritional status of stroke patients improves following swallowing therapy by nurses.

Comparación de tres o más medias (muestras independientes).

- Se realiza a través de la prueba de Kruskal-Wallis.
- La prueba es una ampliación de la prueba de Mann-Whitney para más de dos muestras independientes.
- La escala de medición es por lo menos ordinal.

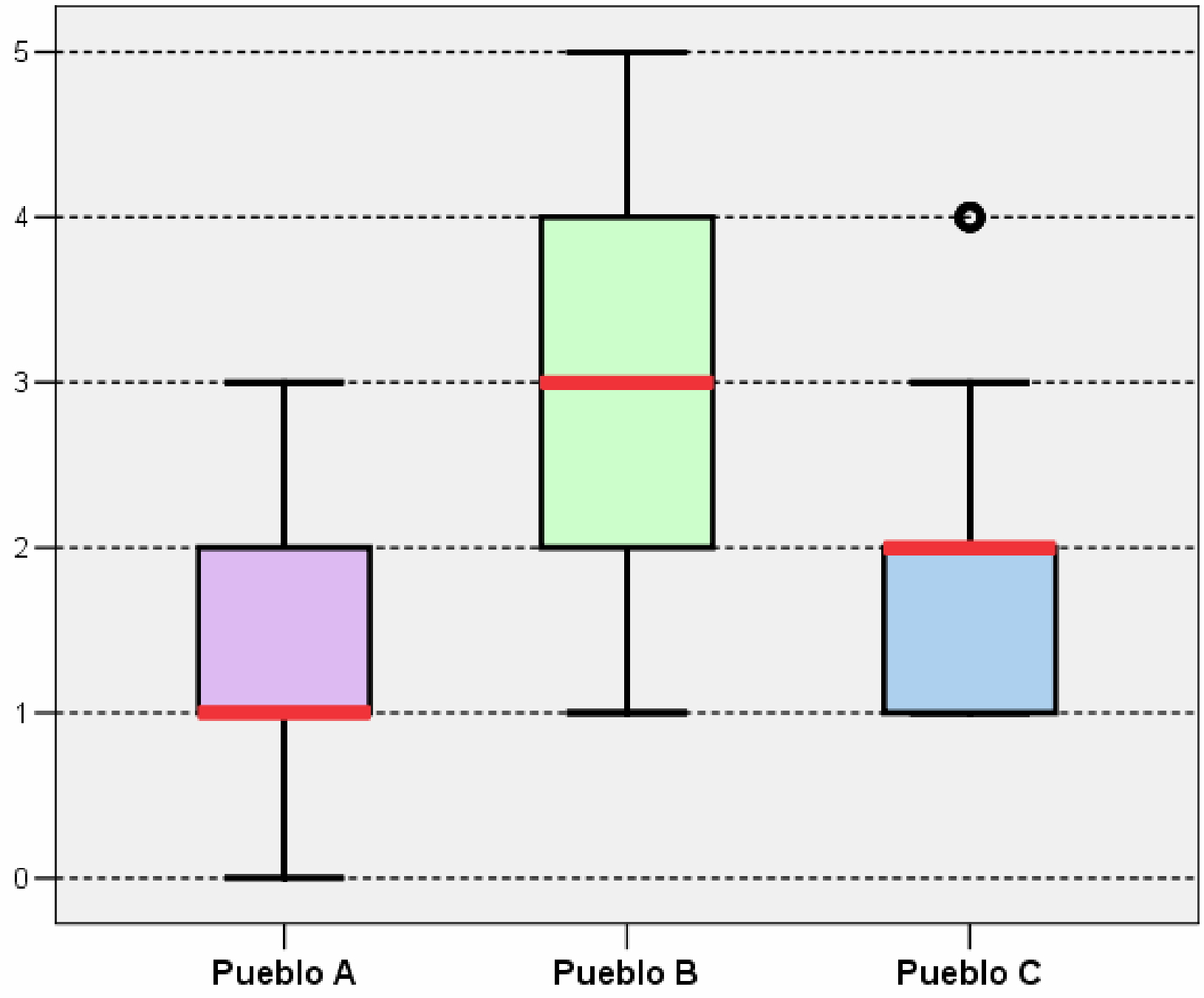
Prueba de Kruskal-Wallis

- En una encuesta socio demográfica, se seleccionó una muestra de tres pueblos. Una de las variables de interés fue el número de habitaciones por vivienda.
- ¿Qué análisis estadístico aplicaría en este caso?

Descriptives

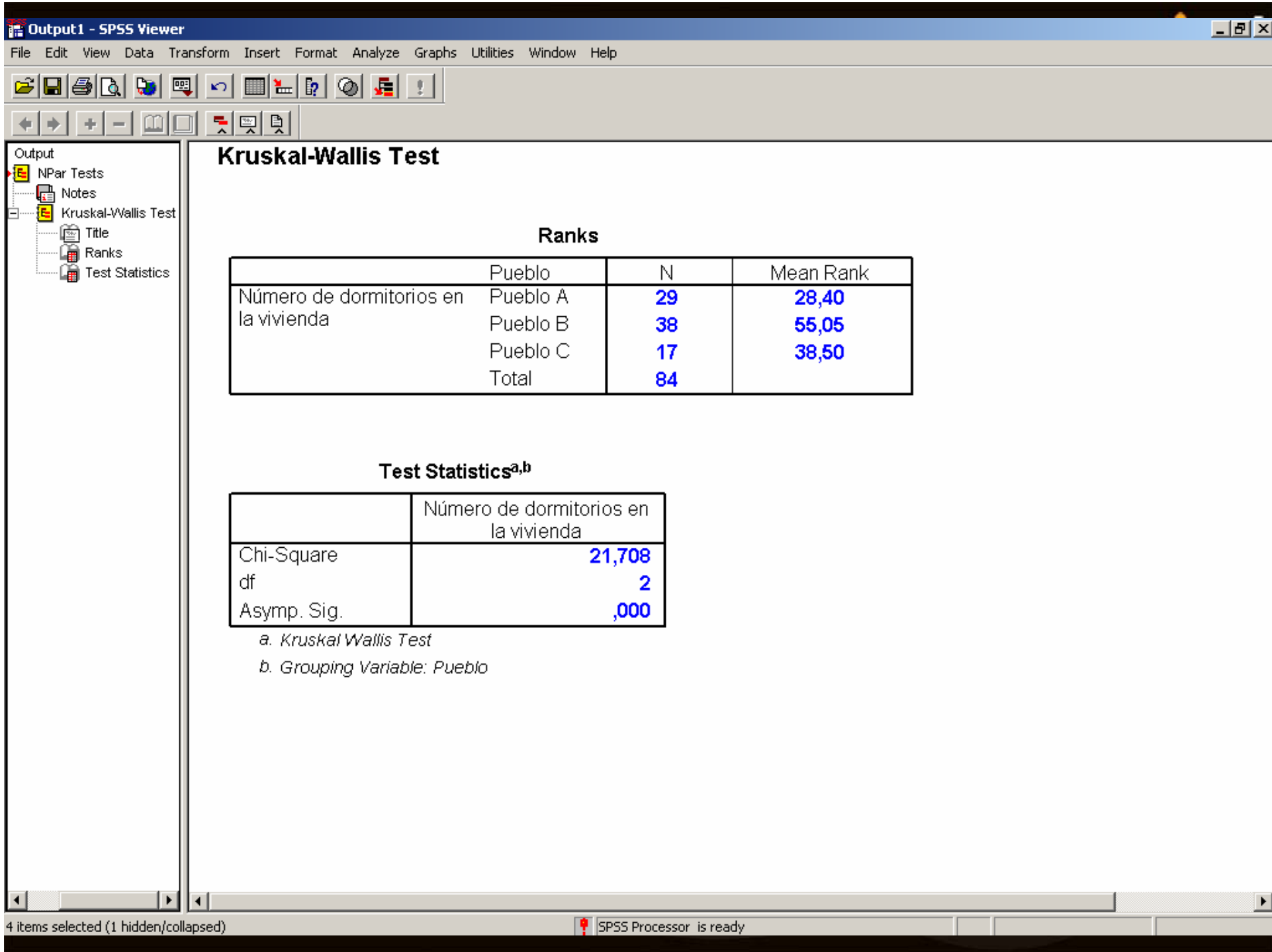
		Pueblo	Statistic
Número de dormitorios en la vivienda	Pueblo A	Mean	1,45
		Median	1,00
		Minimum	0
		Maximum	3
		Skewness	,423
		Kurtosis	-,099
	Pueblo B	Mean	2,95
		Median	3,00
		Minimum	1
		Maximum	5
		Skewness	,169
		Kurtosis	-1,126
	Pueblo C	Mean	2,00
		Median	2,00
		Minimum	1
		Maximum	4
		Skewness	,912
		Kurtosis	-,393

Número de dormitorios en la vivienda



Tests of Normality

		Kolmogorov-Smirnov		
		Statistic	df	Sig.
Número de dormitorios en la vivienda	Pueblo A	,303	29	,000
	Pueblo B	,179	38	,004
	Pueblo C	,265	17	,003



Kruskal-Wallis Test

Ranks

	Pueblo	N	Mean Rank
Número de dormitorios en la vivienda	Pueblo A	29	28,40
	Pueblo B	38	55,05
	Pueblo C	17	38,50
	Total	84	

Test Statistics^{a,b}

	Número de dormitorios en la vivienda
Chi-Square	21,708
df	2
Asymp. Sig.	,000

a. Kruskal Wallis Test

b. Grouping Variable: Pueblo

Quality of Life in Women With Breast Cancer in Turkey

Özge Uzun, Fatma Eti Aslan, Deniz Selimen, Mehmet Koç

***Purpose:** To determine quality of life (QoL) of Turkish women with breast cancer, and to examine whether QoL was related to sociodemographic or clinical variables.*

***Design:** This descriptive study was conducted with a convenience sample of 72 Turkish women with breast cancer recruited from two hospitals in Turkey.*

***Methods:** The data were collected using a questionnaire, the Quality of Life Scale (QoLS), and the Visual Analogue Scale (VAS), and were analyzed using descriptive statistics.*

***Findings:** Two sociodemographic variables (educational background and employment status) were related to QoL of women with breast cancer. No statistically significant difference was found between patients with and without pain on scores obtained from the overall QoLS.*

***Conclusions:** The mean scores of total scale and subscales related to QoL perceived by women were considered to be moderately high. However, findings showed that educational level, employment status, and level of pain affected the level of QoL in Turkish women with breast cancer in varying degrees. Further studies are needed to determine specific effects of sociodemographic and clinical variables on QoL.*

Statistical Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS version 7.5, for Windows). Descriptive statistics were used to examine the frequency distributions and mean scores of the scale and all subscales. The independent samples *t* tests or Kruskal Wallis one-way analysis of variance (ANOVA) tests were used to compare means among patients' sociodemographic variables, clinical variables, and QoL. Kruskal-Wallis one-way analysis of variance tests are nonparametric, and the tests were used for data which were not distributed homogeneously (for example; one group on one variable had fewer than 30 participants) (Aksakoglu, 2001). For analyses a *p* value less than .05 was considered significant.

Table 1. Comparison of Quality of Life Scores Related To Sociodemographic Characteristics of Patients with Breast Cancer (N=72)

Characteristics	<i>n</i>	(%)	Total scores mean (<i>SD</i>)	<i>p</i>
Age				
30-49 years	31	43.1	148.1 (25.4)	.42
≥50 years	41	56.9	147.2 (23.2)	
Area of residence				
Western region	39	54.2	154.0 (21.3)	.15
Eastern region	33	45.8	140.1 (25.1)	
Education level				
Literate without any diploma	16	22.2	132.7 (19.8)	.000 ^a
Primary school	26	36.1	143.6 (20.9)	
High school	5	6.9	140.6 (30.0)	
College	25	34.7	162.7 (20.9)	
Marital status				
Married	49	68.1	148.7 (26.8)	.50
Unmarried	10	13.9	150.8 (17.6)	
Widowed	13	18.1	141.0 (15.7)	
Monthly income				
Low	29	40.3	139.9 (20.3)	.08
Moderate	39	54.2	153.2 (25.2)	
High	4	5.6	148.7 (24.0)	

Conclusions

In this study the quality of life of Turkish women with breast cancer was relatively high. Findings showed that educational level, employment status, and degree of pain affected the level of QoL to varying degrees in these 72 participants. These findings have many implications. Patient education should be provided with particular attention to factors that affect QoL. Supportive interventions should be adapted to the needs of illiterate and literate, unemployed, surgical patients with particular attention to encouraging peer-support-group participation, psychosocial counseling, and facilitation of tangible aid. In addition, incorporating pain management guidelines into the delivery of patient care is an important nursing intervention toward improving a patient's quality of life.

Ventajas de los métodos No Paramétricos

- No incorporan los supuestos restrictivos de las pruebas paramétricas.
- No requieren que la población subyacente esté normalmente distribuido.
- El uso de rangos permite menos errores.
- Son más fáciles de calcular.

Desventajas de los métodos No Paramétricos

- El uso de pruebas no paramétricas con datos que pueden manejarse con pruebas paramétricas produce un desperdicio de información.
- La aplicación de algunas de las pruebas no paramétricas puede ser laboriosa para muestras grandes.



Gracias por su atención

cgutierrezv@unmsm.edu.pe

www.epiredperu.net