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Highlights

- Line Spread Test Results
- Outpatient Therapeutic Programme
- White Rice Porridge with Egg
- Effect of Four Types of Thickening Agents

Discovering Thoughts, Inventing Future

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Nutrition & Food Science

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Line Spread Test Results for Commercially Available the White Rice Porridge with Salted Plum - Including the Effect of Four Types of Thickening Agents Added after Blending -

By Naomi Katayama, Shoko Kondo & Mayumi Hirabayashi

Nagoya Women's University

Abstract- We added four commercially available thickeners to white rice porridge with salty plum, which is popular in Japan, and compared the viscosity. Porridge containing water is useful even in the event of a disaster. In Japan, porridge is useful as a stockpile of food during disasters. Porridge is used as a meal of a wide range of age groups, form the elderly to infants. However, if porridge is made into a liquid using a mixer, etc., it becomes a food with a high risk of aspiration for people with impaired swallowing function. Therefore, it is necessary to add a thickener to the liquid porridge to increase its viscosity. In order to keep the consistency, the thickening agent should be changed according to the amount of nutrients contained in the porridge.

Keywords: commercial product, white rice porridge with salted plum, lin spread test (LST), thickener.

GJMR-L Classification: NLMC Code: QU 145

Line Spread Test Results for Commercially Available the White Rice Porridge with Salted Plum - Including the Effect of Four Types of Thickening Agents Added After Blending -

Naomi Katayama [α], Shoko Kondo [σ] & Mayumi Hirabayashi [ρ]

Abstract- We added four commercially available thickeners to white rice porridge with salty plum, which is popular in Japan, and compared the viscosity. Porridge containing water is useful even in the event of a disaster. In Japan, porridge is useful as a stockpile of food during disasters. Porridge is used as a meal of a wide range of age groups, form the elderly to infants. However, if porridge is made into a liquid using a mixer, etc., it becomes a food with a high risk of aspiration for people with impaired swallowing function. Therefore, it is necessary to add a thickener to the liquid porridge to increase its viscosity. In order to keep the consistency, the thickening agent should be changed according to the amount of nutrients contained in the porridge. As a result, viscosity was stable in the order of Thickener D(dextrin, Polysaccharide thickener, and calcium lactate), B(dextrin, xanthan gum, tri-sodium chloride, calcium lactate), A(dextrin, polysaccharide thickener, potassium chloride, sucralose as sweetener), and C(dextrin, water-soluble dietary fiber, xanthan gum as thickener). A thickener containing dextrin and calcium lactate was compatible with porridge and stabilized the viscosity. In order to prepare for disasters, it is necessary to stockpile thickeners sutable for porridge.

Keywords: commercial product, white rice porridge with salted plum, lin spread test (LST), thickener.

I. Introduction

In recent years, various disasters have occurred in Japan. In this case, disaster food that is stockpiled will be used. It is difficult to provide meals in a state where lifelines are cut, and there is no water, gas, or electricity. At that time, porridge containing water is helpful. White rice porridge is widely available as nursing care food for the elderly and baby food for infants. However, porridge can cause aspiration pneumonia in people with impaired swallowing ability.

In order for people with impaired swallowing function to eat porridge safely, it is necessary to add a thickener suitable for the porridge. We reported that using porridge made by adding salted plum (umeboshi) to white rice, which is very popular in Japan, the viscosity measured by adding four types of thickening agents to porridge.

II. Materials and Methods

The nutritional components of the white rice porridge with salted plum used in this experiment are shown in Table 1. The white rice porridge with salty plum used had 36.00 kcal, 0.6g of protein, 0.12g of Fat, 8.2g of carbohydrate, and 0.36-0.84g of sodium per 100g (displayed on the product packaging).

Table 1. Contents and nutritional value of commercial porridge

	Contents	Nutrient contents (Per 100g)				
		Energy (kcal)	Protein (g)	Fat (g)	Carbohydrates (g)	Sodium (mg)
White rice porridge with salted plum	Non-glutinous rice,	36	0.6	0.12	8.2	0.36~0.84

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Table 2 shows the content and nutritional value of four commercially available thickeners. Main component of all thickeners was dextrin (displayed on the product packaging).

Talbe 2 Content and nutritional value of four types of thickeners

	Contents	Nutrient contents (Per 2g)					
		Energy (kcal)	Protein (g)	Fat (g)	Carbohydrates (g)		Sodium (mg)
					Sugar (g)	Dietary fiber (g)	
A	Dextrin、Polysaccharide thickener、potassium chloride、sweetener (Sucralose)	5.27	0.00	0.00	0.87	0.47	10.67
B	Dextrin、Xanthan gum、Trisodium chloride、Calcium lactate	4.00	0.00	0.00	1.00	0.70	3.00
C	Dextrin、Water-soluble dietary fiber、Thickener (Xanthan gum)	5.40	0.00	0.00	1.36	0.50	12.33
D	Dextrin、Polysaccharide thickener、Calcium lactate	0.53	0.03	0.00	0.91	0.83	24.00

a) Sample (food with Thickener added) adjustment

Samples were adjusted according to previous reports[1,2,3,4]. Each of the three foods was prepared as follows.

1) The viscosity of the food product was measured without any modification (homogenize with a mixer) after 30seconds, 5minnutes, 15minnutes, and 30minutes.
2) The viscosity of the food product was measured with modification (homogenize with a mixer) after 30seconds, 5minnutes, 15minnutes, and 30minutes.
3) The viscosity was measured on the food product with modification (homogenize with a mixer) after adding 2 grams of thickener (A, B, C, and D) to the food (100g) after 30seconds, 5minnutes, 15minnutes, and 30minutes.

b) Viscosity measurement method

Using the Line Spread Test Start Kit (LST) manufactured by SARAYA, the viscosity of each food was measured. The measurement procedure is as follows. The line spread test (LST) was performed in a room with a room temperature of 24 degrees. Viscosity measurements by line spread test (LST) were performed three repetitions using the same sample. Data was obtained by averaging the viscosity results of three repeated measurements. The measurement method was according to Line Spread Test Start Kit (LST) manufactured by SARAYA.

1. Place the sheet on a level surface. Place a ring with an inner diameter of 30mm in the center of the concentric circles.
2. Add the liquid to be measured to the total thickness in the ring (capacity is 20ml) and let stand for 30 seconds.
3. Lift the ring vertically, and after 30 seconds, measure the spread distance of the solution. Six points on the outermost circumference of the sample spread concentrically were measured, and the average value was calculated as the result of LST values.
4. After 5 minutes, the spread of the samples is measured again at 6 points, and the average value is recorded as the LST value.

c) Criteria for viscosity

There are three levels of classification by LST value[5]. The first stage is mildly thick with a viscosity that falls within 43mm to 36mm (50-150 mPa・s). As for the properties, when the spoon is tilted, it flows down quickly[2]. The second stage is moderately thick with a viscosity that falls within 36mm to 32mm (150-300 mPa・s). As for the properties, when you tilt the spoon, it flows to the surface[2]. The third stage is highly thick with a viscosity that falls within 32mm to 30mm (300-500 mPa・s). Even if the spoon is tilted, the shape is maintained to some extent, and does not flow easily[5].

d) Statistical processing

This study was statistically processed using statistical software (Excel 2010: SSRI Co., Ltd). The data to be compared were first tested for normal distribution by F-test. For comparisons between correlated data, the paired Student-t test was used for normally distributed data. Wilcoxon test was used for non-normally distributed data.

III. Results

Table 3 shows the line spread test results. The viscosity of white rice porridge with salted plum decreased from moderately thick to mildly thick with time. When the white rice porridge with salty plum was processed with a mixer so that it became a uniform liquid, the viscosity became mildly thick. When thickeners B and D were added to the liquid white rice porridge with salty plum, the viscosity remained highly dense. But, when thickener A and C were added to the liquid white rice porridge with salty plum, the viscosity decreased from highly dense to moderately dense with time.

Table 3. Viscosity measurement results of four types of thickeners for salted plum rice porrigde using the line spread test

	After 30 seconds	After 5 minutes	After 15 minutes	After 30 minutes
No adjustment	35.6 ± 3.4	37.4 ± 3.7	37.6 ± 3.8	38.9 ± 3.7
Mixer processing (MP)	44.8 ± 3.0	48.6 ± 6.4	47.5 ± 4.7	47.3 ± 4.8
MP with Thickener A (Toromicria)	30.0 ± 3.5	31.3 ± 3.9	31.1 ± 3.8	31.4 ± 4.6
MP with Thickener B (Tururinko)	28.4 ± 1.7	29.7 ± 1.9	29.9 ± 1.9	30.2 ± 2.0
MP with Thickener C (Toromifaiver)	30.3 ± 2.8	30.9 ± 2.0	31.0 ± 1.9	32.8 ± 3.3
MP with Thickener D (Neohaitoromi-ru)	23.7 ± 3.4	24.1 ± 3.9	24.7 ± 4.0	25.3 ± 4.3

a) Statistical processing results

The line spread test results and statistical processing results are shown in Table 4-9. Except for the sample with Thickener A, C, and D, the viscosity was statistically significantly weakened from 30 seconds to 5 minutes after putting the white rice porridge with salty plum on the viscometer plate under other conditions. However, except for the sample with Thickener C, the viscosities of the white rice porridge with salted plum with thickener were highly dense.

Table 4. Line spread test (LST) measurement results of salted plum rice porridge

	After 30 seconds	After 5 minutes	After 5 minutes	After 15 minutes	After 15 minutes	After 30 minutes
Average value ±Standard deviation	35.6±3.4	37.4±3.7	37.4±3.7	37.6±3.8	37.6±3.8	38.9±3.7
F test	P=0.370		P=0.465		P=0.456	
Paired Student t-test	P=0.0001**		P=0.083		P=0.127	
Wilcoxon test						

Table 5. Line spread test (LST) measurement results of salted plum rice porridge after mixer processing (MP)

	After 30 seconds	After 5 minutes	After 5 minutes	After 15 minutes	After 15 minutes	After 30 minutes
Average value ±Standard deviation	44.8±3.0	48.6±6.4	48.6±6.4	47.5±4.7	47.5±4.7	47.2±4.8
F test	P=0.001**		P=0.104		P=0.460	
Paired Student t-test			P=0.283		P=0.331	
Wilcoxon test	P=0.0001**					

Table 6. Line spread test (LST) measurement results of salted plum rice porridge after mixer processing (MP) with Thickener A

	After 30 seconds	After 5 minutes	After 5 minutes	After 15 minutes	After 15 minutes	After 30 minutes
Average value ±Standard deviation	30.0±3.5	31.3±3.5	31.3±3.5	31.1±3.8	31.1±3.8	31.4±4.6
F test	P=0.335		P=0.471		P=0.217	
Paired Student t-test	P=0.264		P=0.659		P=0.469	
Wilcoxon test						

Table 7. Line spread test (LST) measurement results of salted plum rice porridge after mixer processing (MP) with Thickener B

	After 30 seconds	After 5 minutes	After 5 minutes	After 15 minutes	After 15 minutes	After 30 minutes
Average value ±Standard devi	28.4±1.7	29.7±1.9	29.7±1.9	29.9±1.9	29.9±1.9	30.2±2.0
F test	P=0.364		P=0.455		P=0.447	
Paired Student t-test	P=0.0001**		P=0.104		P=0.020*	
Wilcoxon test						

Table 8. Line spread test (LST) measurement results of salted plum rice porridge after mixer processing (MP) with Thickener C

	After 30 seconds	After 5 minutes	After 5 minutes	After 15 minutes	After 15 minutes	After 30 minutes
Average value ±Standard devi	30.3±2.8	30.9±2.0	30.9±2.0	31.0±1.9	31.0±1.9	32.8±3.3
F test	P=0.075		P=0.477		P=0.015*	
Paired Student t-test	P=0.305		P=0.4505			
Wilcoxon test					P=0.070	

Table 9. Line spread test (LST) measurement results of salted plum rice porridge after mixer processing (MP) with Thickener D

	After 30 seconds	After 5 minutes	After 5 minutes	After 15 minutes	After 15 minutes	After 30 minutes
Average value ±Standard dev	23.7±3.4	24.1±3.9	24.1±3.9	24.7±4.0	24.7±4.0	25.3±4.3
F test	P=0.276		P=0.468		P=0.381	
Paired Student t-test	P=0.088		P=0.066		P=0.243	
Wilcoxon test						

IV. Discussions

By adding a commercial Thickener D (including dextrin, calcium lactate, and polysaccharide) to the white rice porridge with salty plum, the viscosity was the highest and was stable. Adding Thickener D (including dextrin, calcium lactate, and polysaccharide) to white rice porridge made it more viscous and stable[6]. Adding Thickener B (including dextrin, calcium lactate, xanthan gum, and tri-sodium chloride) and Thickener D made to white rice porridge with sticky barley (rich in fat) it more viscous and stable[7]. Adding Thickener B (including dextrin, calcium lactate, xanthan gum, and tri-sodium chloride) and Thickener D to white rice porridge with salmon (rich in protein) made it more viscous and stable[8]. As previously reported on the relationship between ease of swallowing and food viscosity[9,10], low viscosity also increases the likelihood of aspiration. In the case of porridge containing fat and protein, adding. Thickener D (including dextrin, calcium lactate, and polysaccharide) stabilized the viscosity.

V. Conclusion

We liquefied white rice porridge with salty plums, popular in Japan, and added four commercially available thickeners to measure the viscosity. As a result, thickener D (including dextrin, calcium lactate, and polysaccharide) was the most viscous and stable when it was added to the porridge. For people with various swallowing functions, stockpiling a thickener that stabilizes the viscosity of the porridge to be stockpiled is necessary in case of a disaster.

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Line Spread Test Results for Commercially Available the White Rice Porridge with Egg - Including the Effect of Four Types of Thickening Agents Added After Blending -

By Mayumi Hirabayashi, Shoko Kondo & Naomi Katayama

Nagoya Women's University

Abstract- Viscosity was evaluated using a line spread test (LST) using white rice porridge with egg, which has more lipids and proteins than white rice porridge and has a wide range of versatility. Liquid porridge is used for older people with weak chewing, and babies as baby food have low viscosity, and are highly likely to be aspirated by people with weakened swallowing function. Therefore, a uniform liquid porridge was prepared using a mixer, and the viscosity was measured. As a result, it was shown that liquid porridge is thin and has a high risk of aspiration in people with weakened swallowing function. In order to increase the viscosity of the liquefied white rice porridge with egg, commercially available thickeners (four different types) were added. The viscosity of white rice porridge with egg with added thickener was evaluated using the line spread test (LST).

Keywords: commercial product, white rice porridge with egg, lin spread test (LST), thickener.

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Line Spread Test Results for Commercially Available the White Rice Porridge with Egg - Including the Effect of Four Types of Thickening Agents Added After Blending -

Mayumi Hirabayashi [α], Shoko Kondo [σ] & Naomi Katayama [ρ]

Abstract- Viscosity was evaluated using a line spread test (LST) using white rice porridge with egg, which has more lipids and proteins than white rice porridge and has a wide range of versatility. Liquid porridge is used for older people with weak chewing, and babies as baby food have low viscosity, and are highly likely to be aspirated by people with weakened swallowing function. Therefore, a uniform liquid porridge was prepared using a mixer, and the viscosity was measured. As a result, it was shown that liquid porridge is thin and has a high risk of aspiration in people with weakened swallowing function. In order to increase the viscosity of the liquefied white rice porridge with egg, commercially available thickeners (four different types) were added. The viscosity of white rice porridge with egg with added thickener was evaluated using the line spread test (LST). As a result, the viscosity of the white rice porridge with egg to which the thickener containing dextrin, calcium lactate and thickening polysaccharide was added was stable. We need to investigate more combinations of porridges and thickeners that exhibit high density.

Keywords: commercial product, white rice porridge with egg, lin spread test (LST), thickener.

I. Introduction

There are many types of porridge on the market, some of which are highly nutritious. Among them, white rice porridge with egg containing a lot of protein and Fat is more versatile than white rice porridge. It can be used as liquid porridge for baby food, older people with weak mastication, and sick patients. However, liquid porridge is highly likely to be aspirated by people with impaired swallowing function. Therefore, liquid porridges often require the addition of thickeners. Combining porridges of varying nutritional value and thickeners may not provide sufficient viscosity. In this study, we used a commercially available white rice porridge with egg, and four different Thickeners in chooses from many different kind of Thickeners. We evaluated the viscosity of the rice porridge after adding four types of thickeners using a line spread test (LST).

II. Materials and Methods

The nutritional components of the white rice porridge with egg used in this experiment are shown in Table 1. The white rice porridge with egg used had 36.00 kcal, 1.32g of protein, 0.92g of Fat, 5.72g of carbohydrate, and 0.52g of sodium per 100g (displayed on the product packaging).

Table 1. Contents and nutritional value of commercial porridge

Contents		Nutrient contents (Per 100g)				
		Energy (kcal)	Protein (g)	Fat (g)	Carbohydrates (g)	Sodium (mg)
White rice porridge with egg	Egg、Non-glutinous rice、Bonito flakes extract、Salr、soy sauce、Yeast extract powder、Thickener（modified starch）、acidulant	36.00	1.32	0.92	5.72	0.52

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Table 2 shows the content and nutritional value of the four commercially available Thickeners. The main component of all thickeners was dextrin (displayed on the product packaging).

Talbe 2 Content and nutritional value of four types of thickeners

	Contents	Nutrient contents (Per 2g)					
		Energy (kcal)	Protein (g)	Fat (g)	Carbohydrates (g)		Sodium (mg)
					Sugar (g)	Dietary fiber (g)	
A	Dextrin、Polysaccharide thickener、potassium chloride、sweetener (Sucralose)	5.27	0.00	0.00	0.87	0.47	10.67
B	Dextrin、Xanthan gum、Trisodium chloride、Calcium lactate	4.00	0.00	0.00	1.00	0.70	3.00
C	Dextrin、Water-soluble dietary fiber、Thickener (Xanthan gum)	5.40	0.00	0.00	1.36	0.50	12.33
D	Dextrin、Polysaccharide thickener、Calcium lactate	0.53	0.03	0.00	0.91	0.83	24.00

a) Sample (food with Thickener added) adjustment

Samples were adjusted according to previous reports[1,2,3,4]. Each of the three foods was prepared as follows.

1) The viscosity of the food product was measured without any modification (homogenize with a mixer) after 30seconds, 5minnutes, 15minnutes, and 30minutes.
2) The viscosity of the food product was measured with modification (homogenize with a mixer) after 30seconds, 5minnutes, 15minnutes, and 30minutes.
3) The viscosity was measured on the food product with modification (homogenize with a mixer) after adding 2 grams of thickener (A, B, C, and D) to the food (100g) after 30seconds, 5minnutes, 15minnutes, and 30minutes.

b) Viscosity measurement method

Using the Line Spread Test Start Kit (LST) manufactured by SARAYA, the viscosity of each food was measured. The measurement procedure is as follows. The line spread test (LST) was performed in a room with a room temperature of 24 degrees. Viscosity measurements by line spread test (LST) were performed three repetitions using the same sample. Data was obtained by averaging the viscosity results of three repeated measurements. The measurement method was according to Line Spread Test Start Kit (LST) manufactured by SARAYA.

1. Place the sheet on a level surface. Place a ring with an inner diameter of 30mm in the center of the concentric circles.
2. Add the liquid to be measured to the total thickness in thering (capacity is 20ml) and let stand for 30 seconds.
3. Lift the ring vertically, and after 30 seconds, measure the spread distance of the solution. Six points on the outermost circumference of the sample spread concentrically were measured, and the average value was calculated as the result of LST values.
4. After 5 minutes, the spread of the samples is measured again at 6 points, and the average value is recorded as the LST value.

c) Criteria for viscosity

There are three levels of classification by LST value[5]. The first stage is mildly thick with a viscosity that falls within 43mm to 36mm (50-150 mPa・s). As for the properties, when the spoon is tilted, it flows down quickly[2]. The second stage is moderately thick with a viscosity that falls within 36mm to 32mm (150-300 mPa・s). As for the properties, when you tilt the spoon, it flows to the surface[2]. The third stage is highly thick with a viscosity that falls within 32mm to 30mm (300-500 mPa・s). Even if the spoon is tilted, the shape is maintained to some extent, and does not flow easily[5].

d) Statistical processing

This study was statistically processed using statistical software (Excel 2010: SSRI Co., Ltd). The data to be compared were first tested for normal distribution by F-test. For comparisons between correlated data, the paired Student-t test was used for normally distributed data. Wilcoxon test was used for non-normally distributed data.

III. Results

Table 3 shows the line spread test results. The viscosity of white rice porridge with egg decreased from moderately thick to mildly thick with time. The white rice porridge with egg was processed with a mixer to become a uniform viscosity became mildly dense. The thickener B, C, and D were added to the liquid white rice porridge with egg, and the viscosity remained highly viscous. But, with the thickener A added to the liquid white rice porridge with egg, the viscosity decreased from highly dense to moderately dense with time.

Table 3. Viscosity measurement results of four types of thickeners for egg rice porrigde using the line spread test

	After 30 seconds	After 5 minutes	After 15 minutes	After 30 minutes
No adjustment	37.0 ± 3.1	39.5 ± 2.1	40.3 ± 2.4	40.3 ± 2.1
Mixer processing (MP)	48.9 ± 5.6	54.8 ± 11.5	55.5 ± 12.7	54.5 ± 11.6
MP with Thickener A (Toromicria)	30.5 ± 2.8	32.4 ± 4.0	34.0 ± 3.0	34.3 ± 3.1
MP with Thickener B (Tururinko)	26.9 ± 2.3	28.4 ± 2.6	29.3 ± 2.8	29.7 ± 3.2
MP with Thickener C (Toromifaiver)	27.6 ± 3.6	29.1 ± 4.0	29.7 ± 3.9	29.9 ± 4.1
MP with Thickener D (Neohaitoromi-ru)	23.5 ± 5.3	24.5 ± 6.0	26.2 ± 5.7	24.6 ± 5.5

a) Statistical processing results

The line spread test results and statistical processing results are shown in Table 4-9. For all the samples, the viscosity was statistically significantly weakened from 30 seconds to 5 minutes, and from 5 minutes to 15 minutes after putting the white rice porridge with egg on the viscometer plate under other conditions. The viscosities of the white rice porridge with egg with thickeners B, C, and D were highly dense.

Table 4. Line spread test (LST) measurement results of egg rice porridge

	After 30 seconds	After 5 minutes	After 5 minutes	After 15 minutes	After 15 minutes	After 30 minutes
Average value ±Standard deviation	37.0±3.1	39.5±2.1	39.5±2.1	40.3±2.4	40.3±2.4	40.3±2.1
F test	P=0.058		P=0.309		P=0.305	
Paired Student t-test	p-0.0001**		p-0.0001**		p=0.668	
Wilcoxon test						

Table 5. Line spread test (LST) measurement results of egg rice porridge after Mixer processing (MP)

	After 30 seconds	After 5 minutes	After 5 minutes	After 15 minutes	After 15 minutes	After 30 minutes
Average value ±Standard deviation	48.9±5.6	54.8±11.5	54.8±11.5	55.5±12.7	55.5±12.7	54.5±11.6
F test	P=0.002**		P=0.349		P=0.454	
Paired Student t-test			p=0.579		p=0.306	
Wilcoxon test	p-0.002**					

Table 6. Line spread test (LST) measurement results of egg rice porridge after Mixer processing (MP) with Thickener A

	After 30 seconds	After 5 minutes	After 5 minutes	After 15 minutes	After 15 minutes	After 30 minutes
Average value ±Standard deviation	30.5±2.8	32.4±4.0	32.4±4.0	34.0±3.0	34.0±3.0	34.3±3.1
F test	P=0.070		P=0.120		P=0.458	
Paired Student t-test	p=0.004**		p=0.010**		p=0.780	
Wilcoxon test						

Table 7. Line spread test (LST) measurement results of egg rice porridge after Mixer processing (MP) with Thickener B

	After 30 seconds	After 5 minutes	After 5 minutes	After 15 minutes	After 15 minutes	After 30 minutes
Average value ±Standard deviation	26.9±2.3	28.4±2.6	28.4±2.6	29.3±2.8	29.3±2.8	29.7±3.2
F test	P=0.665		P=0.423		P=0.246	
Paired Student t-test	p=0.0001**		p=0.0001**		p=0.250	
Wilcoxon test						

Table 8. Line spread test (LST) measurement results of egg rice porridge after Mixer processing (MP) with Thickener C

	After 30 seconds	After 5 minutes	After 5 minutes	After 15 minutes	After 15 minutes	After 30 minutes
Average value ±Standard deviation	27.6±3.6	29.1±4.0	29.1±4.0	29.7±3.9	29.7±3.9	29.9±4.3
F test	P=0.315		P=0.474		P=0.432	
Paired Student t-test	p=0.0001**		p=0.0001**		p=0.381	
Wilcoxon test						

Table 9. Line spread test (LST) measurement results of egg rice porridge after Mixer processing (MP) with Thickener D

	After 30 seconds	After 5 minutes	After 5 minutes	After 15 minutes	After 15 minutes	After 30 minutes
Average value ±Standard deviation	23.5±5.3	24.5±6.0	24.5±6.0	26.2±5.7	26.2±5.7	24.5±5.5
F test	P=0.306		P=0.412		P=0.440	
Paired Student t-test	p=0.0001**		p=0.034*		p=0.095	
Wilcoxon test						

IV. Discussions

Using commercially available retort porridge, which is helpful in times of disaster, we tried to make a thick porridge that can avoid the risk of aspiration by people with dysphagia. In a paper published by the authors in the past, adding Thickener D (including dextrin, calcium lactate, and polysaccharide) to white rice porridge made it more viscous and stable[6]. In the white rice porridge with sticky barley (rich in fat), adding Thickener B (including dextrin, calcium lactate, xanthan gum, and tri-sodium chloride) and Thickener D made it more viscous and stable[7]. In white rice porridge with salmon (rich in protein), adding Thickener B (including dextrin, calcium lactate, xanthan gum, and tri-sodium chloride) and Thickener D made it more viscous and stable[8]. In the case of the white rice porridge with egg (rich in fat and protein), adding Thickener D (including dextrin, calcium lactate, and polysaccharide) made it more viscous and stable. As previously reported on the relationship between ease of swallowing and food viscosity[9,10], low viscosity also increases the likelihood of aspiration. Depending on the difference in the nutrients in the target food, it is considered that there is compatibility with other ingredients of the thickener containing dextrin. In order to think of a better combination, it is necessary to measure the viscosity of more combinations of thickeners and porridges.

V. Conclusion

A commercially available retort porridge, which is useful even in the event of a disaster, was used. A thickener added to avoid the risk of aspiration by people with impaired swallowing function. The viscosity of white rice porridge with eggs, which contains more protein and fat than white rice porridge, stabilized when Thickener D (including dextrin, calcium lactate, and polysaccharide) was added. The viscosity is also stabilized when Thickener B (including dextrin, calcium lactate, xanthan gum, and tri-sodium chloride) is added to the white rice porridge with eggs. When the thickener D was added to the white rice porridge with egg, the viscosity of the porridge stabilized more than when the thickener B was added. This difference in viscosity may be due to differences in the polysaccharide content of the thickening agent.

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Diagnosis and Treatment of Severely Malnourished Children in Outpatient Therapeutic Program

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Abstract- Severe acute malnutrition among children is still one of the main public health challenges in the 21st century, particularly in developing countries. It is associated with a high risk of morbidity and mortality. The goals of management of SAM are to prevent short-term mortality, achieve sustained nutritional recovery to reduce susceptibility to life-threatening infections, and support neurocognitive development. In addition to that, SAM children need urgent lifesaving treatment to survive. The outpatient therapeutic feeding program is one dimension of the community-based management of acute malnutrition that provides screening, diagnostic, and treatment services for uncomplicated SAM children 6–59 months of age, by giving home-based treatment as Ready-to-use Therapeutic Food and routine medical treatment. This review article gives a comprehensive update on outpatient therapeutic programmes in light of recently published standard treatment guidelines for the management of uncomplicated severe acute malnutrition.

Keywords: *severe acute malnutrition, outpatient therapeutic program, malnourished children.*

GJMR-L Classification: *DDC Code: 616.804654 LCC Code: RC346*

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Introduction

Severe acute malnutrition (SAM)among children is still one of the main public health challenges in the 21st century, particularly in developing countries (Bhutta & Salam, 2012). It is associated with a high risk of morbidity and mortality (Cashin & Oot, 2018).Children are the most vulnerable group to the effects of severe acute malnutrition during their most rapid physical growth and development, because of the additional nutritional requirements for growth and expansion at this time(Picot et al., 2012). It can manifest over a short period of time when the body does not receive adequate amounts of micronutrients or energy, either as a result of insufficient dietary intake or through malabsorption of nutrients or loss of appetite due to illness (James et al., 2015). It increases dramatically in emergencies and developing countries generally, where these settings are plagued by chronic poverty, poor hygiene, lack of education, poor diets and limited access to food (UNICEF, 2015c).

The goals of management of SAM are to prevent short-term mortality, achieve sustained nutritional recovery to reduce susceptibility life-threatening infections and to support neurocognitive development (Bhutta et al., 2017). In addition to that, SAM children need urgent lifesaving treatment to survive.

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The outpatient therapeutic feeding program is one dimension of the community-based management of acute malnutrition (CMAM) that provides screening, diagnostic and treatment services for uncomplicated SAM children 6–59 months of age, by giving home-based treatment as RUTF and routine medical treatment(Atnafe et al., 2019; UNICEF, 2015a). It brings the management of SAM closer to the community by making services available at decentralized treatment points within the primary health care (PHC) settings (John et al., 2018; WVI, 2017). RUTFs are highly fortified energy dense pastes designed to fulfill 100% of the nutritional needs of children during the recovery from SAM.

Child nutrition outcomes such as acute malnutrition in particular, is recognized as crucial indicator for tracking the nutrition and health status of children in a population (Fadare et al., 2019). The effectiveness of treatment of SAM has been proven through health interventions during emergency settings and routine development programs however there is high risk of program default and fatalities, if the interventions are not delivered adequately (Okello, 2016). The performance indicators for managing SAM of discharged children for SAM are made up of those who have cure≥75%, defaulted<15%, non-respondent or died<10%, based on the Sphere minimum standards are used as a threshold for OTP performance (Sphere, 2018).

Definition of SAM: SAM in children 6–59 months of age is defined as a weight for height/length<–3 Z-score of the WHO growth standard, and, or MUAC of less than 115 mm, or the presence of bilateral pitting edema (nutritional edema)(UNICEF, 2015a; WFP, 2012; WHO, 2013a).

Pathophysiology of SAM: Acute malnutrition typically develops during the first two years of life, when growth velocity and brain development are exceptionally high. The children are particularly susceptible to acute malnutrition if complementary foods are low nutrient density and have low bioavailability of micronutrients. Also, children's nutritional status will be further compromised if complementary foods are given at the wrong time as too early or late, or are contaminated (WHO, 2013a). During short-term starvation, free fatty acids (FFAs) and ketone bodies are primarily oxidized using available fat stores from adipose tissue, and myofibrillar proteins can be broken down into amino

acids, which can be converted into glucose (through gluconeogenesis). After several days of starvation (when body fat has been depleted), myofibrillar proteins are extensively broken down to maintain essential metabolic processes. The short-term regulation of macronutrient oxidation and synthesis depends on insulin and glucagon, whereas the long-term regulation of these processes is mediated by other hormones, such as growth hormone, thyroid hormones, catechol amines and corticosteroids (Bhutta et al., 2017).

SAM can result in profound metabolic, physiological and anatomical changes. All organs and systems are involved in a "reductive adaptation" process due to nutrient shortage. Reductive adaptation is the physiological response of the body to low nutrition i.e., systems slowing down to survive on limited macro and micronutrient intake. The pathophysiological responses to nutrient depletion place children with SAM at increased risk of life threatening complications that lead to increased risk of death. Therefore, successful management of SAM requires both systematic medical therapy of underlying infections and nutritional treatment with therapeutic feeds (WFP, UNICEF, et al., 2017; WHO, 2013a).

Clinical picture of SAM

The common signs and symptoms of SAM include poor appetite, pallor, weight loss, increased thirst or vomiting and diarrhea plus behavior changes as well as excessive drooling(Kasio Iboyi & Zha, 2019). The clinical picture of SAM varies according to its two recognized forms such as marasmus and kwashiorkor (Mwangome et al., 2011):

Clinical signs of marasmus: Severe wasting is a massive loss of body fat and muscle tissue. Children who are severely wasted look almost elderly and their bodies are extremely thin and skeletal (AAH, 2022).

Clinical signs of kwashiorkor: In this form of severe acute malnutrition, edema is present on the lower limbs, and is verified when thumb pressure is applied on top of both feet for three seconds and leaves a pit or indentation in the foot, after the thumb is lifted. Edema may eventually spread to the legs and face, and the child appears puffy, and is usually irritable, weak, and lethargic. Other signs of edema include skin lesions, an enlarged liver and thinning hair. Underneath edema, the muscles have been severely weakened and the child experiences excruciating cramping and muscle pain (AAH, 2022).

Diagnosis of SAM in children

Globally, the most common method for screening and diagnosis of SAM among CU5 as individuals or populations can be done in different ways such as anthropometric measurements (nutritional index), clinical signs or nutritional edema (JMoH, 2013; WFP, 2012; WHO, 2009, 2013b).

Anthropometric measurements and indices

Anthropometry is a crucial tool measurement of the human body used by health providers. It is helpful in determining and monitoring the nutritional status, it is identifies the type of malnutrition and measuring progress toward improvement among children. However, it does not identify specific nutrient deficiencies (e.g., iron or vitamin A). Common anthropometric measurements include: height/length, weight and MUAC (Cashin & Oot, 2018; WFP, FAO, et al., 2017). It is the preferred anthropometric indicator to assess acute malnutrition, where MUAC better than WHZ at identifying high risk children in the community (MoPHP et al., 2008; WFP, UNICEF, et al., 2017). Age, sex and bilateral pitting edema are essential parameters in anthropometry(WFP, FAO, et al., 2017).

Weight for Height Z-scores (WHZ): Anthropometric Z-scores describe how far and in what direction an individual's measurement is from the reference populations' median value. According to the WHO Growth Standards, the reference population is children the same sex and age. Z-scores that fall outside of the normal range indicate a nutritional issue (Cashin & Oot, 2018). WHZ is considered to be an essential measure of nutritional status and helpful in identifying SAM, it is appropriate threshold for diagnosing marasmus. It is calculated from patient's weight, height and sex, using WHO Growth Standards. It can be estimated using growth charts/tables and, or calculated using computer software(Cashin & Oot, 2018; JMoH, 2013; Picot et al., 2012; WFP, 2012; WHO, 2009, 2013b, 2020).

Mid Upper Arm Circumference (MUAC): Measurement of MUAC provides a reliable and simple tool for screening nutritional status and also enables rapid assessment of large populations in epidemiological field studies. (Shinsugi et al., 2020). WHO and UNICEF recommended using the MUAC as an independent indicator of SAM. It is a helpful measure within community or during emergency situations, when measuring children's height and weight may prove difficult. MUAC is also used for diagnosis, admission and discharges of children with SAM, particularly in CMAM programs, because it is a simple and inexpensive measurement and does not require a chart to calculate. It is measured by a band around the mid-point of the upper left arm of the child (Cashin & Oot, 2018; JMoH, 2013; Picot et al., 2012; WFP, 2012; WHO, 2009, 2013b, 2020).Study conducted in India by Aguayo et al. (2015), concluded that MUAC appears to be an appropriate criterion for identifying SAM children.

Clinical signs of bilateral edema

Bilateral pitting edemais a clinical sign of a specific form of SAM known as nutritional edema (edematous malnutrition or kwashiorkor). It is a swelling caused by the accumulation of fluid in the body tissues and can be categorized as mild (edema in both

feet/ankles), moderate (edema in feet plus lower legs, hands or lower arms) and severe (generalized edema including feet, legs, hands, arms and face)(WHO, 2020):

Outpatient treatment of SAM

The outpatient treatment of SAM programs aims for more widespread access to treatment primarily by establishing the appropriate facilities and activities within more communities (UNICEF, 2012).The rapid expansion of community based treatment programs worldwide, lead to every year millions of children being treated for SAM (Briend & Berkley, 2016). Typically, children treated in the community with uncomplicated SAM have a CFR less than 5%(Williams & Berkley, 2018). Uncomplicated severely malnourished children should be managed as outpatients, by providing them with weekly of RUTF, which can often follow at home if the child has clinically well, alert and retained appetite.(Jones & Berkley, 2014; Lenters et al., 2016; WHO, 2019; Williams & Berkley, 2018).

SAM treatment program depends on the four following principles; maximum coverage and access, timeliness, appropriate care and care for as long as it is needed (Lenters et al., 2016). Therefore the program strives to reach all severely malnourished children before the development of medical complications and to provide appropriate care until recovery. The program uses community health workers or volunteers to actively find cases of acute malnutrition within the community. The severely malnourished children treated should be supplemented with routine medications during the treatment course such as vitamin A, folic acid, antibiotics, deworming and measles vaccine(Al Amad et al., 2017).

Children with SAM should be treated proactively with intensive treatment regimens of short duration, aiming to rehabilitate the child in a few weeks. OTP is currently used to achieve rapid recovery from SAM, it provides services of SAM management closer to the community at primary health care facilities, where uncomplicated SAM children receive different amounts of RUTF as Plumpy'Nut sachets according to their body weight(Al Amad et al., 2017; WFP, UNICEF, et al., 2017).The caregivers visits the health facility or OTP point every week or two weeks with their child for a medical checkup and to receive a weekly supply of RUTF. OTP should be operated in as many health facilities as possible and should be incorporated into existing health services as a component of routine services for CU5, this ensures good geographic coverage so that as many malnourished children as possible can access treatment(WFP, UNICEF, et al., 2017).

Admission criteria in OTP: According to the national guidelines for management of SAM based on WHO, UNICEF and WFP recommendations, admission criteria in OTP are determined by a child's weight and height, by calculating weight-for-height as "Z-score" using the WHO Child Growth Standard, MUAC and presence of edema. Cutoffs are summarized as the following (UNICEF, 2012, 2015b; WFP, UNICEF, et al., 2017; WHO, 2013a, 2020):

- ✓ Bilateral pitting edema 1st (+) or 2nd (++) degree, or
- ✓ MUAC < 115 mm, and/or
- ✓ Weight-for Height/Length < -3 z-score, and
- ✓ Good appetite (passed appetite test for RUTF), and
- ✓ Clinically well and alert (no medical complications).

Routine medications and prevention package used in OTP

All SAM programs should include systematic treatments according to national or international guidance (Sphere, 2018). Children admitted directly to OTP should receive a short and routine course of essential oral medication such as antibiotic (Amoxicillin), anti worms (as Albendazole or Mebendazole), anti malaria, vit A, folic acid and measles vaccination, and some prevention package as soap and bed net. It reduced the risk of severe bacterial infection and improves the recovery rate (MoPHP, 2014; Pati et al., 2018; WFP, UNICEF, et al., 2017; WHO, 2013a).The use of broad-spectrum antibiotics has been conditionally recommended for treatment of uncomplicated SAM. (Black et al., 2016). A systematic review conducted byWilliams and Berkley (2018), concluded the current evidence supports the continued use of broad spectrum oral amoxicillin for treating children with uncomplicated SAM.

Nutritional treatment by RUTF: The development specially formulated RUTF has enabled treatment of SAM in the community and made a difference in child survival. It is provides 100% of the energy needed from foods(Osendarp et al., 2015). RUTF has become a standard method of treating SAM and is easier to use and distribute during nutritional emergencies. It is a very effective therapeutic food in the rehabilitation children with SAM in many settings (Bazzano et al., 2017; UNICEF, 2012).

Plumpy-Nut® is one of the most of RUTF used in the world, it is a commercial product of Nutriset (UNICEF, 2012). An average entier course of treatment for a child amounts to around 10-15 kilograms of RUTF over a 6-8 week period(Force, 2012; UNICEF, 2013).If the mother is still breastfeeding, she is advised to give the RUTF after breast milk, explain that clean water must be given to a child eating RUTF to keep them adequately hydrated and should be given RUTF before other foods. It should not be given to children who are allergic to peanuts or dairy products. About central nutritional values describe in the table (2.1)(NUTRISET, 2018).Each sachet of Plumpy'Nut® of 92g provides 500kcal. A child undergoing treatment for SAM should take in approximately 200kcal/kg/day. Provide a weekly

supply of Plumpy'Nut® sachets based on the child's body weight (NUTRISET, 2018; WFP, UNICEF, et al., 2017). Some contexts, families receive additional rations to prevent household sharing of the child's RUTF ration (WVI, 2017).

Main nutritional values (NUTRISET, 2018)

.Plumpy'Nut® formula: elements for 92 g					
Energy	500 kcal	Copper	1.5 mg	Vitamin B1	0.46 mg
Proteins	12.8 g	Iron	10.3 mg	Vitamin B2	1.5 mg
Lipids	30.3 g	Iodine	98 µg	Vitamin B6	0.55 mg
Carbohydrates	45 g	Selenium	28 µg	Vitamin B12	1.5 µg
Calcium	302 mg	Sodium	165 mg	Vitamin K	14.4 µg
Phosphorus	343 mg	Vitamin A	0.79 mg	Biotin	56 µg
Potassium	1 171 mg	Vitamin D	14 µg	Folic acid	184 µg
Magnesium	80 mg	Vitamin E	18.4 mg	Pantothenic acid	2.8 mg
Zinc	11.8 mg	Vitamin C	46 mg	Niacin	4.6 mg

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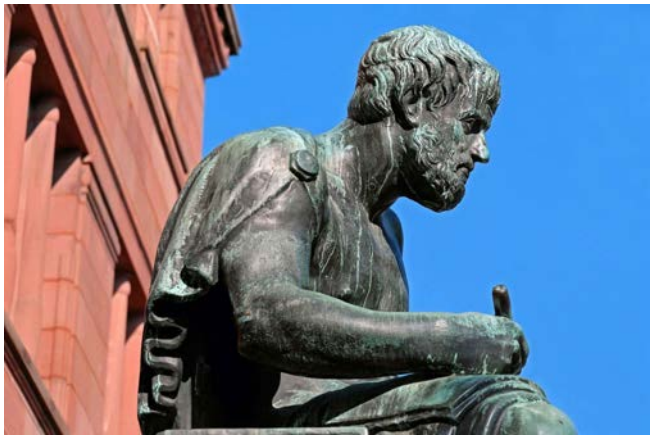

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Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

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Color charges: Authors are advised to pay the full cost for the reproduction of their color artwork. Hence, please note that if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a Color Work Agreement form before your paper can be published. Also, you can email your editor to remove the color fee after acceptance of the paper.

Tips for writing a good quality Medical Research Paper

1. Choosing the topic: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

2. Think like evaluators: If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

3. Ask your guides: If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

4. Use of computer is recommended: As you are doing research in the field of medical research then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

5. Use the internet for help: An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow here.

6. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right? It is a good habit which helps to not lose your continuity. You should always use bookmarks while searching on the internet also, which will make your search easier.

7. Revise what you wrote: When you write anything, always read it, summarize it, and then finalize it.

8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

9. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

10. Use proper verb tense: Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.

Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

19. Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

20. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

21. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

22. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

23. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.

Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.
- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."

Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

The Administration Rules

Administration Rules to Be Strictly Followed before Submitting Your Research Paper to Global Journals Inc.

Please read the following rules and regulations carefully before submitting your research paper to Global Journals Inc. to avoid rejection.

Segment draft and final research paper: You have to strictly follow the template of a research paper, failing which your paper may get rejected. You are expected to write each part of the paper wholly on your own. The peer reviewers need to identify your own perspective of the concepts in your own terms. Please do not extract straight from any other source, and do not rephrase someone else's analysis. Do not allow anyone else to proofread your manuscript.

Written material: You may discuss this with your guides and key sources. Do not copy anyone else's paper, even if this is only imitation, otherwise it will be rejected on the grounds of plagiarism, which is illegal. Various methods to avoid plagiarism are strictly applied by us to every paper, and, if found guilty, you may be blacklisted, which could affect your career adversely. To guard yourself and others from possible illegal use, please do not permit anyone to use or even read your paper and file.

Criterion for Grading a Research Paper (Compilation) by Global Journals

Please note that following table is only a Grading of "Paper Compilation" and not on "Performed/Stated Research" whose grading solely depends on Individual Assigned Peer Reviewer and Editorial Board Member. These can be available only on request and after decision of Paper. This report will be the property of Global Journals.

Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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