BAB V

KESIMPULAN DAN SARAN

A. Kesimpulan

Hasil penelitian dan analisis data-data statistik terhadap uji sifat fisik tablet paracetamol dapat disimpulkan:

1. Madu dapat digunakan sebagai bahan pengikat pembuatan tablet paracetamol dengan granulasi basah.

2. Ada perbedaan yang signifikan antara ketiga formula tablet paracetamol yang dibuat dengan pengikat madu pada konsentrasi 5%, 6%, 7% yang meliputi kekerasan tablet, kerapuhan tablet, dan waktu hancur tablet. Sedangkan keseragaman bobot menunjukkan tidak ada perbedaan yang signifikan.

3. Konsentrasi 7% adalah formula terbaik.

B. Saran

Hasil penelitian dan analisa data serta kesimpulan tersebut diatas, penulis menyarankan sebaiknya:

1. Perlu dilakukan penelitian dengan menggunakan bahan pengikat lain dengan bahan aktif paracetamol

2. Perlu dilakukan penelitian lebih lanjut tentang pembuatan tablet paracetamol dengan metode lain.

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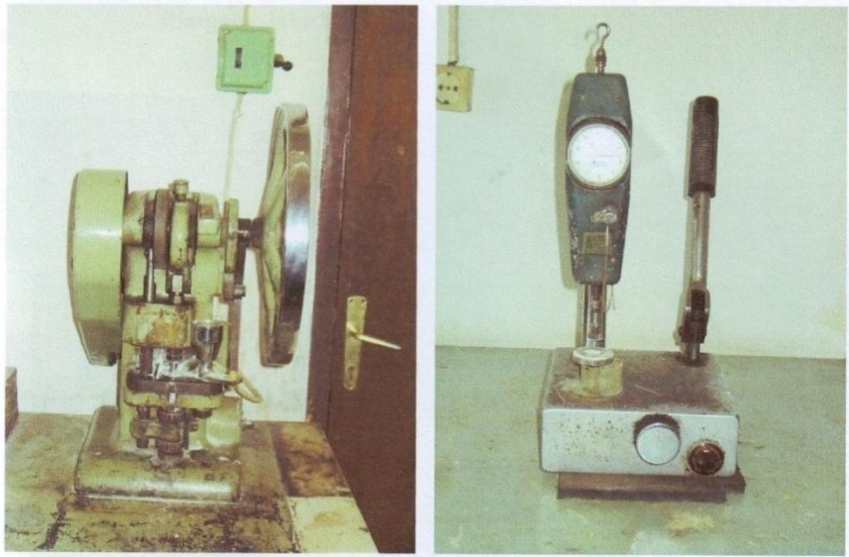**Lampiran 1**. Foto tablet Paracetamol pengikat madu

Formula 1

Formula 2

Formula 3

Lampiran 2. foto alat

Single Punch   *Hardness Tester*

Friabilator Tester

Lampiran 3. Gambar alat moisture balance

Moisture Balance

Lampiran 4. Formulasi tablet paracetamol dengan pengikat madu

Formulasi tablet paracetamol dengan pengikat madu

Bahan (mg)	Formula I Madu 5%	Formula II Madu 6%	Formula III Mdu 7%
Paracetamol	500	500	500
Laktosa	98	91,5	85
Madu	32,5	39	45,5
Mg stearat	6,5	6,5	6,5
Explotab	13	13	13
Bobot tablet	650	650	650

Perhitungan bahan pembuatan 100 tablet :

Madu 5 % $= \dfrac{5}{100}$ x 650 mg = 32,5 mg x 100 = 3250 mg

Madu 6 % $= \dfrac{6}{100}$ x 650 mg = 39 mg x 100 = 3900 mg

Madu 7% $= \dfrac{7}{100}$ x 650 mg = 42,5 mg x 100 = 4250 mg

Paracetamol = 500 mg x 100 = 50.000 mg = 50 g

Mg stearat = 6,5 mg x 100 = 650 mg

Explotab = 13 mg x 100 = 1300 mg = 1,3 g

Laktosa F I = 98 mg x 100 = 9800 mg = 9,8 g

F II = 91,5 mg x 100 = 9150 mg = 9,15 g

F III = 85 mg x 100 = 8500 mg = 8,5 g

Lampiran 5. Data Waktu Alir Granul

Waktu Alir granul (20 mg)

No.	Madu 5%	Madu 6%	Madu 7%
	Waktu Alir (detik)	Waktu Alir (detik)	Waktu Alir (detik)
1.	1,40	1,23	1,13
2.	1,25	1,16	1,21
3.	1,56	1,45	1,28
4.	1,55	1,42	1,13
5.	1,56	1,33	1,14

Dikonversikan dari 20 mg ke 100 mg, contoh perhitungan :

1,43 detik / 20 mg = (x) detik / 100 mg

(x) detik = $\frac{1,40\ detik}{20\ mg}$ x 100 mg

(x) detik = 7,00

Waktu Alir granul (100mg)

No.	Madu 5%	Madu 6%	Madu 7%
	Waktu Alir (detik)	Waktu Alir (detik)	Waktu Alir (detik)
1.	7.00	6.15	5.65
2.	6.25	5.80	6.05
3.	7.80	7.25	6.4
4.	7.75	7.10	5.65
5.	7.80	6.65	5.70
$\bar{x}$	7.3200	6.5900	5.8900
SD	0.68793	0.61583	0.33053

Perhitungan Statistik

NPar Tests

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
waktu alir	15	6.6000	.80000	5.65	7.80

One-Sample Kolmogorov-Smirnov Test

		waktu alir
N		15
Normal Parameters[a,b]	Mean	6.6000
	Std. Deviation	.80000
Most Extreme Differences	Absolute	.136
	Positive	.136
	Negative	-.125
Kolmogorov-Smirnov Z		.526
Asymp. Sig. (2-tailed)		.945

a. Test distribution is Normal.

b. Calculated from data.

Oneway

Descriptives

waktu alir

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
formula 1	5	7.3200	.68793	.30765	6.4658	8.1742	6.25	7.80
formula 2	5	6.5900	.61583	.27541	5.8253	7.3547	5.80	7.25
furmula 3	5	5.8900	.33053	.14782	5.4796	6.3004	5.65	6.40
Total	15	6.6000	.80000	.20656	6.1570	7.0430	5.65	7.80

Test of Homogeneity of Variances

waktu alir

Levene Statistic	df1	df2	Sig.
1.875	2	12	.196

ANOVA

waktu alir

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.113	2	2.557	7.975	.006
Within Groups	3.847	12	.321		
Total	8.960	14			

Post Hoc Tests

Homogeneous Subsets

waktu alir

Student-Newman-Keuls[a]

		Subset for alpha = 0.05	
Formula	N	1	2
furmula 3	5	5.8900	
formula 2	5	6.5900	6.5900
formula 1	5		7.3200
Sig.		.074	.064

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 5,000.

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Lampiran 6. Data Sudut diam

Sudut diam granul

No.	Madu 5%	Madu 6%	Madu 7%
	Sudut diam	Sudut diam	Sudut diam
1.	29,99	28,89	28,84
2.	29,77	28,91	28,47
3.	29,70	29,96	27,05
4.	30,92	29,73	27,84
5.	29,22	28,82	28,83
6.	29,86	28,89	28,26
7.	30,56	29,95	27,33
8.	30,87	29,33	27,96
9.	29,71	28,99	28,36
10.	29,91	28,85	28,84
$\bar{x}$	30,05	29,23	28,12
SD	0,553	0,473	0,588

Perhitungan Statistik

NPar Tests

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Sudutdiam	30	29.1337	.95964	27.05	30.92

One-Sample Kolmogorov-Smirnov Test

		sudutdiam
N		30
Normal Parameters[a,b]	Mean	29.1337
	Std. Deviation	.95964
Most Extreme Differences	Absolute	.122
	Positive	.093
	Negative	-.122
Kolmogorov-Smirnov Z		.671
Asymp. Sig. (2-tailed)		.759

a. Test distribution is Normal.

b. Calculated from data.

Oneway

Descriptives

Sudutdiam

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
formula1	10	30.0510	.55318	.17493	29.6553	30.4467	29.22	30.92
formula2	10	29.2320	.47316	.14963	28.8935	29.5705	28.82	29.96
formula3	10	28.1180	.58780	.18588	27.6975	28.5385	27.05	28.84
Total	30	29.1337	.95964	.17520	28.7753	29.4920	27.05	30.92

Test of Homogeneity of Variances

Sudutdiam

Levene Statistic	df1	df2	Sig.
.079	2	27	.924

ANOVA

Sudutdiam

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	18.827	2	9.414	32.261	.000
Within Groups	7.879	27	.292		
Total	26.706	29			

Post Hoc Tests

Homogeneous Subsets

sudutdiam

Scheffe[a]

Formulatab	N	Subset for alpha = 0.05		
		1	2	3
formula3	10	28.1180		
formula2	10		29.2320	
formula1	10			30.0510
Sig.		1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 10,000.

Lampiran 7. Data Susut pengeringan granul

Susut pengeringan granul

Berat (gram)	Madu 5%	Madu 6%	Madu 7%
Berat mula-mula	2,00	2,02	2,01
Berat konstan	1,89	1,92	1,91
LOD (%)	5,50%	5,00%	5,00%

Contoh perhitungan LOD

$$\% \text{ LOD} = \frac{2,00 - 1,89}{2,00} \times 100 \%$$

$$= 5,50 \%$$

Lampiran 8. Uji keseragaman bobot tablet paracetamol

Data keseragaman bobot tablet paracetamol

No.	Madu 5%	Madu 6%	Madu 7%
	Bobot dalam mg	Bobot dalam mg	Bobot dalam mg
1.	647	649	658
2.	649	653	663
3.	645	660	659
4.	660	654	660
5.	658	639	649
6.	640	655	657
7.	661	664	662
8.	653	654	653
9.	638	648	646
10.	658	658	647
11.	638	655	652
12.	647	648	647
13.	652	641	650
14.	659	650	640
15.	640	642	651
16.	643	652	660
17.	652	649	647
18.	649	654	655
19.	657	647	647
20.	662	658	652
$\bar{x}$	650.40	651.50	652.75
SD	8.009	6.387	6.290
CV	1,23%	0,98%	0,96%

1. Perhitungan penyimpangan bobot dengan bahan pengikat Madu formula I:

    a. Kolom A (5%)

        Formula I = $\frac{5}{100}$ x 650.40 mg = 32,52 mg

        Range persyratan Formula I = 200 mg ±32,52 = 167,48 – 232,52

    b. Kolom B (10%)

        Formula I = $\frac{10}{100}$ x 650.40 mg = 65,04 mg

        Range persyratan Formula I = 200 mg ±65,04 = 134,96 – 265,04

2. Perhitungan penyimpangan bobot dengan bahan pengikat Madu formula II:

    a. Kolom A (5%)

        Formula I = $\frac{5}{100}$ x 651.50mg = 32,575 mg

        Range persyratan Formula II = 200 mg ± 32,575 = 167,425 – 232,575

    b. Kolom B (10%)

        Formula I = $\frac{10}{100}$ x 651.50 mg = 65,15 mg

        Range persyratan Formula II = 200 mg ± 65,15 = 134,85 – 265,15

3. Perhitungan penyimpangan bobot dengan bahan pengikat Madu formula III:

    a. Kolom A (5%)

        Formula I = $\frac{5}{100}$ x 652.75mg = 32,635 mg

        Range persyratan Formula II = 200 mg ± 32,635 = 167,365 – 232,635

    b. Kolom B (10%)

        Formula I = $\frac{10}{100}$ x 652.75mg = 65,275 mg

        Range persyratan Formula II = 200 mg ± 65,275 = 134,725 – 265,275

Lampiran 9 Data. Uji kekerasan tablet

Data uji kekerasan tablet

No.	Madu 5%	Madu 6%	Madu 7%
	Kekerasan (kg)	Kekerasan (kg)	Kekerasan (kg)
1.	5.5	6.4	7.5
2.	5.1	5.8	8.0
3.	4.9	5.6	7.9
4.	5.4	6.8	7.7
5.	4.7	6.5	8.0
6.	4.1	6.2	7.4
7.	5.3	6.6	6.8
8.	5.1	5.5	7.2
9.	5.6	6.3	7.5
10.	5.2	6.8	7.1
$\bar{x}$	5.090	6.250	7.510
SD	0.4408	0.4720	0.4012

Perhitungan Statistik

NPar Tests

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
kekerasan	30	6.283	1.0907	4.1	8.0

One-Sample Kolmogorov-Smirnov Test

		kekerasan
N		30
Normal Parameters[a,b]	Mean	6.283
	Std. Deviation	1.0907
Most Extreme Differences	Absolute	.135
	Positive	.135
	Negative	-.082
Kolmogorov-Smirnov Z		.737
Asymp. Sig. (2-tailed)		.650

a. Test distribution is Normal.

b. Calculated from data.

Oneway

Descriptives

kekerasan

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
formula 1	10	5.090	.4408	.1394	4.775	5.405	4.1	5.6
formula 2	10	6.250	.4720	.1493	5.912	6.588	5.5	6.8
furmula 3	10	7.510	.4012	.1269	7.223	7.797	6.8	8.0
Total	30	6.283	1.0907	.1991	5.876	6.691	4.1	8.0

Test of Homogeneity of Variances

Kekerasan

Levene Statistic	df1	df2	Sig.
.225	2	27	.800

ANOVA

Kekerasan

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	29.299	2	14.649	76.020	.000
Within Groups	5.203	27	.193		
Total	34.502	29			

Post Hoc Tests

Homogeneous Subsets

kekerasan

Student-Newman-Keuls[a]

Formula	N	Subset for alpha = 0.05		
		1	2	3
formula 1	10	5.090		
formula 2	10		6.250	
furmula 3	10			7.510
Sig.		1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 10,000.

Lampiran 10. Data Kerapuhan Tablet

Berat tablet (g)	Madu 5%			Madu 6%			Madu 7%		
	1	2	3	1	2	3	1	2	3
Sebelum	13,011	13,104	13,115	13,058	13,109	13,079	13,104	13,113	13.087
Sesudah	12,915	13,003	13.016	12,978	13.019	12,992	13.028	13,047	13,016
Kerapuhan %	0,74%	0,77%	0,75%	0,61%	0,69%	0,67%	0,57%	0,50%	0,54%
$\overline{x}$	$\overline{x}$ = 0,7533 % SD = 0,01528			$\overline{x}$ = 0,6567% SD = 0,04163			$\overline{x}$ = 0,5367% SD = 0,03512		

Contoh perhitungan % kerapuhan tablet = 0,74%

- Berat 20 tablet yang sudah dibebas debukan   = 13,011 gram

- Berat 20 tablet setelah perlakuan   = 12,915 gram

- % kerapuhan = $\underline{\text{beratawal} - \text{beratsetelahperlakuan}}$ X   100 %
  beratawal

$$= \frac{13,011 - 12,915}{13,011} \ X \ 100 \ \%$$

$$= 0,74 \ \%$$

Perhitungan Statistik

NPar Tests

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
kerapuhan	9	.6489	.09816	.50	.77

One-Sample Kolmogorov-Smirnov Test

		kerapuhan
N		9
Normal Parameters[a,b]	Mean	.6489
	Std. Deviation	.09816
Most Extreme Differences	Absolute	.157
	Positive	.123
	Negative	-.157
Kolmogorov-Smirnov Z		.470
Asymp. Sig. (2-tailed)		.980

a. Test distribution is Normal.

b. Calculated from data.

Oneway

Descriptives

kerapuhan

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
formula	3	.7533	.01528	.00882	.7154	.7913	.74	.77
formula 2	3	.6567	.04163	.02404	.5532	.7601	.61	.69
furmula 3	3	.5367	.03512	.02028	.4494	.6239	.50	.57
Total	9	.6489	.09816	.03272	.5734	.7243	.50	.77

Test of Homogeneity of Variances

Kerapuhan

Levene Statistic	df1	df2	Sig.
1.400	2	6	.317

ANOVA

Kerapuhan

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.071	2	.035	33.135	.001
Within Groups	.006	6	.001		
Total	.077	8			

Post Hoc Tests

Homogeneous Subsets

Kerapuhan

Student-Newman-Keuls[a]

		Subset for alpha = 0.05		
Formula	N	1	2	3
furmula 3	3	.5367		
formula 2	3		.6567	
Formula	3			.7533
Sig.		1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 3,000.

Lampiran 11. Data waktu hancur

No.	Madu 5%	Madu 6%	Madu 7%
	Waktu hancur (detik)	Waktu hancur (detik)	Waktu hancur(detik)
1.	625	657	718
2.	603	669	728
3.	619	675	739
4.	596	681	746
5.	631	695	752
6.	596	665	719
7.	609	659	758
8.	631	674	743
9.	617	689	726
10.	621	693	739
11.	601	672	728
12.	619	694	735
13.	608	681	754
14.	639	657	778
15.	625	664	741
$\bar{x}$	616,00	675,00	740,27
SD	13,342	13,427	16,011

Perhitungan Statistik

NPar Tests

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
waktu hancur	45	677.09	53.198	596	778

One-Sample Kolmogorov-Smirnov Test

		waktu hancur
N		45
Normal Parameters[a,b]	Mean	677.09
	Std. Deviation	53.198
Most Extreme Differences	Absolute	.118
	Positive	.118
	Negative	-.112
Kolmogorov-Smirnov Z		.791
Asymp. Sig. (2-tailed)		.558

a. Test distribution is Normal.

b. Calculated from data.

Oneway

Descriptives

waktu hancur

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
formula	15	616.00	13.342	3.445	608.61	623.39	596	639
formula 2	15	675.00	13.427	3.467	667.56	682.44	657	695
furmula 3	15	740.27	16.011	4.134	731.40	749.13	718	778
Total	45	677.09	53.198	7.930	661.11	693.07	596	778

Test of Homogeneity of Variances

waktu hancur

Levene Statistic	df1	df2	Sig.
.069	2	42	.934

ANOVA

waktu hancur

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	115914.711	2	57957.356	282.885	.000
Within Groups	8604.933	42	204.879		
Total	124519.644	44			

Post Hoc Tests

Homogeneous Subsets

waktu hancur

Student-Newman-Keuls[a]

		Subset for alpha = 0.05		
Formula	N	1	2	3
Formula	15	616.00		
formula 2	15		675.00	
furmula 3	15			740.27
Sig.		1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 15,000.