IJRAR.ORG E-ISSN: 2348-1269, P-ISSN: 2349-5138

INTERNATIONAL JOURNAL OF RESEARCH AND ANALYTICAL REVIEWS (IJRAR) | IJRAR.ORG

An International Open Access, Peer-reviewed, Refereed Journal

COMPARATIVE STUDY OF GENERIC LOCAL BRANDS AND DIFFERENT MULTINATIONAL BRANDS OF PARACETAMOL AVAILABLE IN THE LOCAL MARKET OF LUCKNOW, INDIA

[1]Kartikay Prakash, [2]Sana Parvez

[1]Research Scholar, [2]Research Scholar,

[1]M. Pharm, Department of Pharmaceutics, Aryakul College of Pharmacy and Research, Lucknow, (Uttar Pradesh), 226008.

ABSTRACT

A lot of suppliers around the world are marketed Paracetamol tablets; PCM is one of the popular OTC products among patients. Paracetamol is commonly and widely used as antipyretic and analgesic. By doing this Research work, we compare and performing the evaluation parameter in the various brands of paracetamol tablets marketed in Uttar Pradesh state of Republic of India. Five different brands of paracetamol 500mg were taken in this Research work. These brands are manufactured by multinational companies and local companies. Different Pharmacy shops are used for randomly sampling of these Brands. The study was exclusively experimental that used BP, USP and other official books to assess the in vitro quality of paracetamol tablet using different analytical techniques and procedures. Various Evaluation Parameters were performed. These Evaluation Parameters include the determination of weight variation, hardness, friability, drug content, and disintegration time and dissolution profile. Acceptable & Wearable Weight variation and friability are seen in all brands. Only one brand is more fragile as compare to other. The physical and chemical tests like in-vitro dissolution, disintegration, hardness etc. were found to be varying but within the specified limits. At the point of Conclusion, Local Brands of Paracetamol are found to be Safe Enough and will use to achieve desired therapeutic effect.

KEYWORD

Tablet, Paracetamol, Evaluation Parameter, Disintegration Test, Dissolution Test.

1. INTRODUCTION

Paracetamol:

Paracetamol, known as Acetaminophen, is an over-the-counter (OTC) Drug, a non-opioid analgesic, possessing Antipyretic and Analgesic properties. It is a drug of Class Non-Opioid Analgesic, Subclass: NSAIDs (non-steroidal anti-inflammatory drug)[1]. In India, it has been more the 30 years paracetamol has been treated as an analgesic for domestic medication and it is also well established as a very effective treatment for the relief of fever and pain in adults and children. It has become the most extensively accepted antipyretic and analgesic all over the world due to being relatively safe in recommended doses. But, overdoses of paracetamol and prolonged duration of taking this drug can cause potentially fatal liver damage. Hepatotoxicity due to paracetamol overdose leads to liver injury which is a common cause of poisoning worldwide as well as toxicity in kidney. Furthermore, DNA synthesis is also hindered by paracetamol that leads to promote genotoxicity and carcinogenicity[2].

Paracetamol or Acetaminophen is which possesses analgesic and antipyretic activity Due to its poor ability to inhibit Cyclo-Oxygenase (COX) in the presence of high concentration of peroxides, it has weak anti-inflammatory effects. The therapeutic dose of Paracetamol is 0.5-1 g in adult (maximum of 4 g/day) and 10-15 mg/Kg every 4-6 hours in children. Dosage form in which it is available in market are as tablet, capsule, suspension or solution (liquid), drops, extended-release (Long acting) tablet, orally disintegrating tablet, suppository, intravenous, and intramuscular injection[3].

Setting of specification sampling, testing and analytical clearance are the measures which can covered in a quality control of drugs and drug products. A Quality Control are intended to ensure that initial material, intermediate, finished product, materials used for packaging ensures the identification of quality, strength and purity of the drug. For the Validation of any pharmaceutical tablet, evaluation parameters should be performed Such as: Weight variation test, test of content uniformity, diameter and thickness test, hardness test, test for friability, disintegration test, and in-vitro dissolution test[4,5].

2. MATERIALS AND METHODS

2.1 MATERIALS

All Chemicals and Reagent used are Laboratory Grade. All Chemicals, Reagents and Logistical support are provided by an academic organisation. For working standard, United State Pharmacopeia & British Pharmacopoeia were used as a reference for the experimental Research work.

Four multinational brands & one generic or local brands of compressed tablets (TABLE 1) of Paracetamol were purchased and collected from a Pharmacy[6].

Table 1. Four Multinational Brands & One Generic or Local Brands Of Compressed Tablets Of Paracetamol.

S.NO.	Brands	Labelled as
1.	**Generic Brand**	Tablet A
2.	**Multinational brand A**	Tablet B
3.	**Multinational brand B**	Tablet C
4.	**Multinational brand C**	Tablet D
5.	**Multinational brand D**	Tablet E

To guarantee the efficacy and safety of the pharmaceutical tablet, quality control test Weight Variation test, Disintegration Test, Friability Test, Dissolution Test, Hardness Test should be performed. 10 tablets with same batch number and labelled to contained Paracetamol 500 mg were randomly buy from a Pharmacy Shop or Medical Store[6,7].

The same procedure for each test was applied in each brand.

TABLE 2. The Required Analysis Tests Used to Evaluate Quality of Brands

TYPE OF TESTS	KEY INFORMATION THAT PROVIDES BY THE TEST[8]
Weight Variation test	Shows the average weight
Disintegration Test	Tells about the time taken by the tablet to disintegrate
Friability Test	Shows how much the tablet can with stand attrition
Dissolution Test	To confirm rate of drug release
Hardness Test	It depicts how much the tablet is prone to friability

Chemicals

TABLE 3: List of Chemicals[9,10,11]

S.NO.	Chemical name
1.	Potassium di hydrogen phosphate
2.	Sodium hydroxide
3.	Distilled water
4.	Ethanol
5.	Hydrochloric acid
6.	Di sodium hydrogen phosphate

Equipments

TABLE 4: List of Instrument[12,15]

S. NO.	INSTRUMENTS NAME
1.	Hardness Tester (Monsanto)
2.	Friability Tester
3.	Dissolution Test Apparatus: USP Type 1 – **Basket** (37°C ± 0.5°C)
4.	Disintegration Test Apparatus: Single Unit
5.	Digital Balance

2.2 METHODS

2.2.1 Weight Variation test

Generally, to identify the uniformity of dose among tablet, Weight Variation test is performed for the validation of the tablet, which ensure the quality, safety and efficacy of the pharmaceutical product. Ten tablets from each brand were selected in sequences; Weigh at individual level with the help of a Digital Analytical Balance. Calculate the Average weight of individual brands and noted down. Weigh all the 10 tablets selected individually and Average weight gets calculated[13, 14].

2.2.2 Hardness Test

This test is done by using Monsanto Hardness tester. Vertically place a tablet on the required apparatus. Apply the load along the radial axis of the tablet. Note the load or weight at which the tablet was break down into pieces. This process had been repeated for each individual tablet of each brand[15].

2.2.3 Friability[19]

This test is performed by using Roche Friabilator. Weigh and place 10 tablet of each brand in order separately. Set the rotation of Friabilator at 25 RPM for 4 Min. again weigh the Tablet in order of their brand. Compared the weight with the initial brand. Calculate the percentage friability by using the formula into the given equation 1.

(Percentage Friability) % F = [1-(Initial weight of tablets**(W)**/Weight of tablets after revolution **(Wo)] x 100**

…….. (1)

% F = Percentage Friability

Wo = Initial weight of tablets,

W = Weight of the tablets after revolution

2.2.4 Tablet Disintegration

Tablets of each brand in the apparatus are placed in order to their sequence in their Brands. Maintain the temperature at 37±0.20°C containing distilled water. Note the time required for disintegrating the tablet[16].

2.2.5 Tablet Dissolution [19] [20]

USP Type-1st (Basket) Apparatus is used to perform this Quality parameter Immersed the tablets into 900 ml of Dissolution Medium. Maintain the Temperature at 37 ± 0.20°C of the Dissolution mediums. Set the Rotation speed of Basket at 50 RPM. Pipette out the 1 ml of the medium at 5, 10, 15, 20, 30, 45, 60 Minutes. Replaced with the Fresh Dissolution medium i.e., Phosphate buffer (pH-5.8). Continue the procedure for the 60 minutes. Note down all the readings. Samples which are pipette out are diluted to 10 ml by using the fresh dissolution medium i.e., Phosphate buffer (pH-5.8). All the samples were filtered out[17].

3. RESULTS AND DISCUSSIONS

3.1 Weight Variation:

During the study, at first the weight variation which is the key to controlling crushing strength and friability of tablet was assessed. The test stated that ALL the samples of paracetamol brands, A & B have passed the weight variation uniformity test as specified in the Indian Pharmacopoeia 2018 (not exceed 5% deviation) [5]. (Table 5)

Table 5: Result of Weight Variation test.

S.NO	NAME OF BRAND = A	NAME OF BRAND = B	NAME OF BRAND = C	NAME OF BRAND = D	NAME OF BRAND = E
	Avg. weight of tablets= **0.605g**	Avg. weight of tablets= **3.14 g**	Avg. weight of tablets= **0.580g**	Avg. weight of tablets= **0.603g**	Avg. weight of tablets= **0.581g**
	Wt. of individual tablets (g)	**Wt. of individual tablets (g)**	**Wt. of individual tablets (g)**	**Wt. of individual tablets (g)**	**Wt. of individual tablets (g)**
1	0.61g	3.05g	0.59g	0.61g	0.59g
2	0.60g	3.20g	0.57g	0.59g	0.59g
3	0.60g	3.05g	0.59g	0.61g	0.58g
4	0.61g	3.15g	0.60g	0.60g	0.58g
5	0.60g	3.10g	0.58g	0.59g	0.59g
6	0.61g	3.10g	0.59g	0.60g	0.56g
7	0.61g	3.20g	0.59g	0.61g	0.58g
8	0.61g	3.25g	0.58g	0.61g	0.58g
9	0.60g	3.20g	0.60g	0.60g	0.58g
10	0.60g	3.15g	0.58g	0.61g	0.58g

3.2. Hardness:

Hardness testing is one of the major Quality control tests for assessing the quality of the tablets for the rationale use of tablet for Humans and their community.

All the tablets of the Each Brand are found to be passed in the Tablet Crushing strength test or Hardness test.

All the tablet of each individual brand has shown acceptable results i.e., 4-10 kg/cm^2 in the test.

The readings of the test are noted down in the table 6[11].

Table 6: Result of Hardness Testing. (kg /cm^2)

S. NO.	TABLET A	TABLET B	TABLET C	TABLET D	TABLET E
1	3.5	7.2	8.1	1.4	3.1
2	3.9	11.2	8.1	0.3	6.2
3	4.1	8	6	2.2	6.2
4	3.2	12.2	8.8	1.9	8
5	5	6.5	6.9	3.5	7.5
6	3.5	10	7.5	3.3	5
7	3.7	5	5	3.8	5.1
8	3.3	5.3	7.9	3.5	5
9	3.4	5.2	7.2	4.5	5.1
10	3.5	5.2	7.0	4.2	5.2

3.3. Friability:

All the brands show acceptable results in terms of Friability. All brands possess exceptional value in terms of Friability. All the acceptable value of test in terms of Friability were ranged from 0.1-0.5% for Paracetamol according to the Indian Pharmacopoeia. Friability values are Less than 1%, it means the tablets are mechanically Stable (Table 5) and all the tablets are ensuring that they are mechanically stable and safe and should be considered for the rationale use of the tablets[19].

Table 6. Percentage friability of four brands of paracetamol 500mg tablet

BRAND	Initial Average Weight of Tablet	Final Average Weight of Tablet	% FRIABILITY
A	0.605	0.602	0.49
B	3.14	3.12	0.34
C	0.587	0.585	0.32
D	0.603	0.601	0.29

3.4. Disintegration Time:

Satisfactory results are shown in the Results of Disintegration test of each brand. Disintegration time standards for uncoated tablets are not more than 5 minutes. (Table 7)

Table 7: Result's Test for Disintegration

S.NO.	BRAND	DISINTEGRATION TIME (In Minutes)
1	**A**	4.53
2	**B**	3.56
3	**C**	3.18
4	**D**	3.30
5	**E**	4.20

3.5. Dissolution:

Dissolution refers as one of the major and important quality Parameters for the tablets. It ensures that tablets are safe, efficient for uses to the Humans and community. Result values of this Test states that tablets should be considered for rational use. Dissolution directly Co-relate with the Absorption and Bioavailability studies of a drug.

Readings of the release rate of all brands of paracetamol was noted down carefully and mentioned below.

- After 10 minutes: 48.5% - 56.1%
- After 60 minutes: 72.8% - 82.8%[16-19]

Table 7: Result of Dissolution Test

TABLET	% Drug Release					
	(5 mins)	**(10 mins)**	**(20 mins)**	**(30 mins)**	**(45 mins)**	**(60 mins)**
A	34.1	48.5	52.1	55.9	62.4	72.8
B	36.7	49.5	52.9	56.7	62.9	73.4
C	36.9	50.5	54.7	58.5	64.1	78.5
D	38.4	52.1	57.5	59.1	65.3	79.8
E	40.2	56.1	59.5	62.3	68.5	82.8

4. CONCLUSION

As we all know, quality parameter states the therapeutics responses of any drug or Formulation. This study elaborates the comparative results of quality parameters of all individual brands. All brands of PCM possess acceptable values in terms of Quality parameter which compiled the expressed and satisfactory specification. Minutes variations are reported in the Hardness test, Disintegration test and In-Vitro Dissolution studies. These variations are reported during the test procedures. In terms of Hardness, it is hardly considered as for mechanical stability, tablets should have adequate and acceptable values in terms of Hardness. If there is variation in the Hardness from the adequate value, it will definitely disturb the Disintegration test. It may also alter the In-Vitro Dissolution Studies. At the end of this research, we noted

the all-quality parameter are inter-connected with other and can be alter by disturbing any one of them. It is very important for a tablet for considered as High-quality tablet to meet all the acceptable and standard values.

CONFLICT OF INTEREST

Author declares there is no conflict of interest in this research project.

ACKNOWLEDGEMENT

Authors are so grateful to the Department of Pharmacy, Aryakul College of Pharmacy and Research, Lucknow and Mahatma Gandhi Institute of Pharmacy, Lucknow for giving me required facilities to conduct the research. We dedicated this research to my Parents & Better Halves.

REFERNCES

1. Khan, A. 2019. Comparative quality evaluation of two brands of paracetamol tablets obtained from the market. International Journal of Pharmaceutical Education and Research (Ijper), *1*(1), 14-18
2. Graham GG, Scott KF, 2005. Mechanism of action of paracetamol, American Journal of Therapeutics, 12(1):46-55.
3. Brune K. 1986. Comparative pharmacology of 'non-opioid' analgesics. Med Toxicol, 1:1-9.
4. The Indian Pharmacopoeia, 1996. Government of India, Ministry of Health and Family Welfare, Controller of publication, New Delhi, 1:556.
5. Rang HP, Dale MM, Ritter JM, Moore PK. 2003. Pharmacology. 5th Ed. London: Churchill Livingstone, 251-252.
6. Mosharraf Z. Determination of the quality control parameters of paracetamol tablets in Bangladesh pharma market [bachelor's thesis]
7. Nayak AK. 2010. Comparative in vitro dissolution assessment of some commercially available paracetamol tablets. Int J Pharm Sci Rev Res. 2:29-30
8. Paracetamol Information Centre, 2000. Paracetamol Chemistry.
9. Oscier CD and Milner QJ. 2009, Peri-operative use of paracetamol. Anaesthesia. 64:65-72.
10. Bertolini A and Ferrari A. 2006. Paracetamol: New vistas of an old drug. CNS Drug Rev. 12:250-275:
11. Mathur N and Kumar R. 2015. Evaluation of quality control parameters on various brands of paracetamol tablet formulation. World J Pharm Pharm Sci. 4: 976-984.
12. Thakuri GMS and Yadav KK, Chhetri RR. 2016. Comparative in-vitro analysis of different brands of paracetamol tablets available in Nepal. J Coast Life Med. 4: 645-648.
13. Haritha B, A Review on Evaluation of Tablets. Journal of Formulation Science and Bioavailability. 2017; 1(1):1-5
14. Teklu L, Adugna E, Ashenef A. 2014. Quality Evaluation of Paracetamol Tablets obtained from the Common Shops (Kiosks) in Addis Ababa, Ethiopia. International Journal of Pharmaceutical Sciences and Research. 5(8): 3502-3510.
15. Srivastava P, Malviya R, Kulkarni GT. 2010. Formulation and evaluation of Paracetamol tablets to assess binding property of orange peel pectin. International Journal of Pharmaceutical Sciences Review and Research. 3(1):30-34.

16. Kumar S, Shashikant, Agnihotri R. 2012. In-Vitro Evaluation of Two Marketed Brands of Paracetamol tablets using Quality Control Tests. International Journal of Pharmaceutical Sciences and Research. 3(9): 3337-3341.
17. Dahiwal SS, Bhokare SG. 2017. In-Vitro Evaluation of marketed brands of Paracetamol tablets in India using quality control tests. International Journal of Pharmacy and Pharmaceutical Research. 10 (1): 182-192.
18. Medication and Drugs. Retrieved April 22, 2010. Medicine Net. 1996-2010.
19. Saleem M, Shahin M, Srinivas B, Begum A. 2014. Evaluation of tablets by friability apparatus. Int. J Res Pharm Chem. 4(4):837-840.