Journal of Student Research
Research Article (2019)
Volume 8: Issue 2; pp 18-23

Cracking the WHIP: An Evaluation of Baseball's Hall of Fame Pitchers

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Walks plus hits per inning pitched (WHIP) is a key performance metric for pitchers in Major League Baseball (MLB). The authors analyze WHIP and its two components, walks and hits, to determine whether Hall of Fame pitcher performance has changed over time since the Hall of Fame's first induction in 1936. All inducted pitchers are divided into four roughly equal groups. The results reveal that pitchers inducted between 1936 and 1959 gave up significantly fewer walks per inning pitched while pitchers inducted between 1960 and 1979 gave up significantly more hits per inning pitched. However, in general, WHIP displays no statistically significant trend over time, as the small number of walks per inning pitched among early inductees is offset by a large number of hits given up per inning pitched among later inductees.

Keywords: Baseball Hall of Fame, WHIP, pitchers, t-test, simple regression

Is it getting easier for pitchers to get into baseball's Hall of Fame? First-year eligible ballplayers include 10-season veterans who have been retired for five years. An eligible player must receive at least 75 percent of the votes cast by the Baseball Writers' Association of America (BBWAA) to earn induction to Cooperstown. Players who do not receive the 75 percent plurality necessary for election have up to 15 years of eligibility with the BBWAA. Four years after their last year of eligibility, a ballplayer (who received at least 60 percent of the votes cast in any one year on the BBWAA ballot) becomes eligible for consideration by the Veterans Committee.

Some fans believe that the Hall has become less exclusive, that the gap between old-timers and the newest members has been widening in recent years. There is considerable debate about who belongs in Cooperstown and who does not. In this research note, we compare four different groups of Hall of Fame pitchers inducted between 1936 (the inaugural year of Hall of Fame voting) and 2019.

The number of walks and hits that a pitcher allows per inning, his WHIP, is one of the most common measures for evaluating a pitcher's performance in baseball. While a low WHIP does not guarantee one's immortalization in Cooperstown, this popular statistic assesses how well (or poorly) a pitcher keeps batters off base; the lower the WHIP, the better. Only two pitchers in Major League Baseball (MLB) history have career WHIPs under 1.000: Addie Joss (.9678, inducted in 1978 by the Veterans Committee) and Ed Walsh (.9896, inducted in 1946 by the Veterans Committee). Yankee pitching great Mariano Rivera (1.0003) became baseball's first unanimous Hall of Fame selection in 2019.

The Data

Of the eighty Hall of Fame pitchers listed at www.baseball.reference.com [1], we only include inductees whose primary position was pitcher [2]. The six excluded players (and their respective years pitching in MLB) are: Babe Ruth (1914-21, 1930, 1933); Clark Griffith (1891-1914); Hank O'Day (1884-90); Clark Cummings (1872-77); and Al Spalding (1871-78). Satchel Paige played most of his career in the Negro Leagues (before Jackie Robinson integrated the sport in 1947) and did not make his MLB debut (for the Cleveland Indians) until 1948 at the age of 42. His 476 innings pitched is lowest among all pitchers in the Hall of Fame; Bruce Sutter's 1042 innings pitched (1976-88) is the second lowest number of innings pitched among Hall of Famers. Given his late start in MLB, we excluded Satchel Paige.

We divided our remaining seventy-three pitchers into four groups, each marking a different time period of induction into the Hall of Fame. These time periods are 1936-59 (19 pitchers), 1960-79 (22), 1980-99 (17), and 2000-19 (15).

Table 1. Statistics for Hall of Fame Pitchers

Pitcher	Year Inducted	Years Played	WHIP	IP	Games Played	IP per Game	Walks per 9 IP	Hits per 9 IP
Walter Johnson	1936	1907-1927	1.061	5914.1	802	7.374	2.074	7.476
Christy Mathewson	1936	1900-1916	1.058	4788.2	636	7.529	1.594	7.929
Cy Young	1937	1890-1911	1.130	7356.0	906	8.119	1.489	8.677
Pete Alexander	1938	1911-1930	1.121	5190.0	696	7.457	1.649	8.442
Old Hoss Radbourn	1939	1880-1891	1.149	4527.1	527	8.591	1.739	8.604
Jack Chesbro	1946	1899-1909	1.152	2896.2	392	7.389	2.144	8.224
Joe McGinnity	1946	1899-1908	1.188	3441.1	465	7.401	2.124	8.568

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Pitcher	Year Inducted	Years Played	WHIP	IP	Games Played	IP per Game	Walks per 9 IP	Hits per 9 IP
Eddie Plank	1946	1901-1917	1.119	4495.2	623	7.216	2.146	7.924
Rube Waddell	1946	1897-1910	1.102	2961.1	407	7.276	2.440	7.476
Ed Walsh	1946	1904-1917	1.000	2964.1	430	6.894	1.873	7.123
Lefty Grove	1947	1925-1941	1.278	3940.2	616	6.397	2.711	8.791
Carl Hubbell	1947	1928-1943	1.166	3590.1	535	6.711	1.817	8.676
Herb Pennock	1948	1912-1934	1.348	3571.2	617	5.789	2.308	9.827
Mordecai Brown	1949	1903-1916	1.066	3172.1	481	6.595	1.909	7.683
Kid Nichols	1949	1890-1906	1.224	5067.1	621	8.160	2.259	8.754
Chief Bender	1953	1903-1925	1.113	3017.0	459	6.573	2.124	7.890
Dizzy Dean	1953	1930-1947	1.206	1967.1	317	6.206	2.072	8.779
Ted Lyons	1955	1923-1946	1.348	4161.0	594	7.005	2.425	9.709
Dazzy Vance	1955	1915-1935	1.230	2966.2	442	6.712	2.548	8.522
Bob Feller	1962	1936-1956	1.316	3827.0	570	6.714	4.148	7.692
John Clarkson	1963	1882-1894	1.209	4536.1	531	8.543	2.363	8.521
Eppa Rixey	1963	1912-1933	1.272	4494.2	692	6.495	2.167	9.277
Red Faber	1964	1914-1933	1.302	4086.2	669	6.109	2.671	9.043
Burleigh Grimes	1964	1916-1934	1.365	4180.0	616	6.786	2.788	9.500
Tim Keefe	1964	1880-1893	1.123	5049.2	600	8.416	2.198	7.910
Pud Galvin	1965	1875-1892	1.191	6003.1	705	8.515	1.117	9.602
Red Ruffing	1967	1924-1947	1.341	4344.0	624	6.962	3.193	8.876
Stan Coveleski	1969	1912-1928	1.251	3082.0	450	6.849	2.342	8.921
Waite Hoyt	1969	1918-1938	1.340	3762.1	674	5.582	2.399	9.657
Jesse Haines	1970	1918-1937	1.350	3208.2	555	5.781	2.443	9.705
Rube Marquard	1971	1908-1925	1.237	3306.2	536	6.169	2.335	8.799
Lefty Gomez	1972	1930-1943	1.352	2503.0	368	6.802	3.937	8.234
Sandy Koufax	1972	1955-1966	1.106	2324.1	397	5.855	3.163	6.792
Early Wynn	1972	1939-1963	1.329	4564.0	691	6.605	3.500	8.462
Warren Spahn	1973	1942-1965	1.195	5243.2	750	6.992	2.461	8.290
Mickey Welch	1973	1880-1892	1.226	4802.0	565	8.499	2.431	8.599
Whitey Ford	1974	1950-1967	1.215	3170.1	498	6.366	3.083	7.852
Bob Lemon	1976	1941-1958	1.337	2850.0	460	6.196	3.951	8.081
Robin Roberts	1976	1948-1966	1.170	4688.2	676	6.936	1.731	8.795
Amos Rusie	1977	1989-1901	1.349	3778.2	463	8.161	4.066	8.072
Addie Joss	1978	1902-1910	0.968	2327.0	286	8.136	1.408	7.302
Bob Gibson	1981	1959-1975	1.188	3884.1	528	7.357	3.096	7.597
Juan Marichal	1983	1960-1975	1.101	3507.0	471	7.446	1.820	8.092
Don Drysdale	1984	1956-1969	1.148	3432.0	518	6.625	2.242	8.087
Hoyt Wilhelm	1985	1952-1972	1.125	2254.1	1070	2.107	3.106	7.014
Catfish Hunter	1987	1965-1979	1.134	3449.1	500	6.899	2.489	7.718
Jim Palmer	1990	1965-1984	1.180	3948.0	558	7.075	2.989	7.634

Pitcher	Year Inducted	Years Played	WHIP	IP	Games Played	IP per Game	Walks per 9 IP	Hits per 9 IP
Fergie Jenkins	1991	1965-1983	1.142	4500.2	664	6.778	1.994	8.283
Gaylord Perry	1991	1962-1983	1.181	5350.0	777	6.885	2.320	8.307
Rollie Fingers	1992	1968-1985	1.156	1701.1	944	1.802	2.603	7.797
Hal Newhouser	1992	1939-1955	1.311	2993.0	488	6.133	3.756	8.041
Tom Seaver	1992	1967-1986	1.121	4783.0	656	7.291	2.616	7.472
Steve Carlton	1994	1965-1988	1.247	5217.2	741	7.041	3.162	8.059
Vic Willis	1995	1898-1910	1.209	3996.0	513	7.789	2.730	8.155
Jim Bunning	1996	1955-1971	1.179	3760.1	591	6.363	2.393	8.217
Phil Niekro	1997	1964-1987	1.268	5404.0	864	6.255	3.013	8.400
Don Sutton	1998	1966-1988	1.142	5282.1	774	6.825	2.288	7.994
Nolan Ryan	1999	1966-1993	1.247	5386.0	807	6.674	4.670	6.555
Dennis Eckersley	2004	1975-1998	1.161	3285.2	1071	3.068	2.022	8.426
Bruce Sutter	2006	1976-1988	1.140	1042.0	661	1.576	2.669	7.592
Rich Gossage	2008	1972-1994	1.232	1809.1	1002	1.806	3.641	7.446
Bert Blyleven	2011	1970-1992	1.198	4970.0	692	7.182	2.394	8.388
Tom Glavine	2014	1987-2008	1.314	4413.1	682	6.471	3.059	8.765
Greg Maddux	2014	1986-2008	1.143	5008.1	744	6.732	1.795	8.493
Randy Johnson	2015	1988-2009	1.171	4135.1	618	6.691	3.258	7.282
Pedro Martinez	2015	1992-2009	1.054	2827.1	476	5.940	2.419	7.070
John Smoltz	2015	1988-2009	1.176	3473.0	723	4.804	2.617	7.966
Trevor Hoffman	2018	1993-2010	1.058	1089.1	1035	1.052	2.536	6.990
Jack Morris	2018	1977-1994	1.296	3824.0	549	6.965	3.271	8.395
Roy Halladay	2019	1998-2013	1.178	2749.1	416	6.609	1.938	8.662
Mike Mussina	2019	1991-2008	1.192	3562.2	537	6.634	1.983	8.741
Mariano Rivera	2019	1995-2013	1.000	1283.2	1115	1.151	2.005	6.997
Lee Smith	2019	1980-1997	1.256	1289.1	1022	1.262	3.392	7.909

www.baseball-reference.com

Table 1 lists each of the seventy-three pitchers, their name as it appears on www.baseball-reference.com, the year they were inducted, the years they played in MLB, their career WHIP, career innings pitched (IP), games played, IP per game, walks per 9 IP, and hits per 9 IP. Insofar as IP is concerned, ".1" refers to one-third of an inning and ".2" refers to two-thirds of an inning. To calculate walks and hits per nine innings pitched, ".1" and ".2" are converted to their decimal equivalents (.333 and .667, respectively).

Methodology

We conducted six two-sample *t*-tests in order to compare the mean WHIP in one time period to that of every other time period. The null hypothesis states that the mean WHIP in one time period is equal to that of another time period. The two-tailed alternative hypothesis states that the two mean WHIPs are not equal. In addition, we ran a simple regression of career WHIP against the induction year. We also regressed the two components of WHIP, hits per nine innings pitched and walks per nine innings pitched, against the induction year.

The Results

Table 2. Differences in Average WHIPs among Hall of Fame Pitchers

Years Inducted		Average WHIP		*p*-value on difference[1]
Group 1	Group 2	Group 1	Group 2	
1936 –1959 (n=19)	1960 – 1979 (n=22)	1.161	1.252	**0.0052**
1936 – 1959 (n=19)	1980 – 1999 (n=17)	1.161	1.181	0.4540
1936 – 1959 (n=19)	2000 – 2019 (n=15)	1.161	1.171	0.7469
1960 – 1979 (n=22)	1980 – 1999 (n=17)	1.252	1.181	**0.0140**
1960 – 1979 (n=22)	2000 – 2019 (n=15)	1.252	1.171	**0.0164**
1980 – 1999 (n=17)	2000 – 2019 (n=15)	1.181	1.171	0.7060

[1] All *p*-values in boldface are significant at better than the .05 level for a two-tailed test.

Table 2 summarizes the results of the six *t*-tests that compare the mean WHIP of Hall of Fame pitchers across different time periods. Three of the six tests revealed a discernible difference in average career WHIPs (α = .05): 1936-59 vs. 1960-79 (p = .0052), 1960-79 vs. 1980-99 (p = .014), and 1960-79 vs. 2000-19 (p = .0164). All three significant differences involve pitchers inducted between 1960 and 1979. Their mean career WHIP was higher than that of any other group of inductees.

The regression of career WHIP against the induction year is shown in equation (1) (*t*-values in parentheses):

(1) $$WHIP = 1.2275 - .00002 year\_inducted$$
(1.40) (-0.04) R^2 = <.0001

Equation (1) shows that despite a higher average WHIP among pitchers inducted between 1960 and 1979, there is no discernable time trend over the last eighty-three years.

Table 3. Differences in Average Walks per 9 IP among Hall of Fame Pitchers

Years Inducted		Average Walks per 9 IP		*p*-value on difference[1]
Group 1	Group 2	Group 1	Group 2	
1936 –1959 (n=19)	1960 – 1979 (n=22)	2.076	2.723	**0.0030**
1936 – 1959 (n=19)	1980 – 1999 (n=17)	2.076	2.782	**0.0003**
1936 – 1959 (n=19)	2000 – 2019 (n=15)	2.076	2.600	**0.0028**
1960 – 1979 (n=22)	1980 – 1999 (n=17)	2.723	2.782	0.8144
1960 – 1979 (n=22)	2000 – 2019 (n=15)	2.723	2.600	0.6283
1980 – 1999 (n=17)	2000 – 2019 (n=15)	2.782	2.600	0.4349

[1] All *p*-values in boldface are significant at better than the .05 level for a two-tailed test.

Table 3 shows the results of the *t*-tests comparing average walks per nine innings pitched across all four time periods. The three tests that yield significant differences all involve the time period 1936-59. In particular, pitchers inducted between 1936 and 1959 gave up significantly fewer walks per nine innings pitched, on average.

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Table 4. Differences in Average Hits per 9 IP among Hall of Fame Pitchers

Years Inducted		Average Hits per 9 IP		*p*-value on difference[1]
Group 1	Group 2	Group 1	Group 2	
1936 –1959 (n=19)	1960 – 1979 (n=22)	8.372	8.545	0.4642
1936 – 1959 (n=19)	1980 – 1999 (n=17)	8.372	7.848	**0.0151**
1936 – 1959 (n=19)	2000 – 2019 (n=15)	8.372	7.941	0.0790
1960 – 1979 (n=22)	1980 – 1999 (n=17)	8.545	7.848	**0.0025**
1960 – 1979 (n=22)	2000 – 2019 (n=15)	8.545	7.941	**0.0189**
1980 – 1999 (n=17)	2000 – 2019 (n=15)	7.848	7.941	0.6511

[1] All *p*-values in boldface are significant at better than the .05 level for a two-tailed test.

Table 4 shows the results of the *t*-tests comparing average hits per nine innings pitched across different time periods. The statistically significant tests include 1936-59 vs. 1980-99 (p = .0151), 1960-79 vs. 1980-99 (p = .0025), and 1960-79 vs. 2000-19 (p = .0189). For two of these three tests, pitchers inducted into the Hall between 1960 and 1979, on average, gave up significantly more hits per nine innings pitched than pitchers of any other time period, except for the first time period. This result explains why these same pitchers (inducted between 1960 and 1979) had significantly higher average WHIPs than any other group.

The results in Tables 3 and 4 suggest that walks per nine innings pitched are trending up over time (p = .008), while hits given up per nine innings pitched are trending down over time (p = .01). We regressed each of these two primary components of WHIP against induction year, as shown in equations (2) and (3) (*t*-values in parentheses):

(2) $$walks\_per\_9\_IP = -14.2199 + .0085 year\_inducted$$
(-2.30) (2.71) R^2 = .0936

(3) $$hits\_per\_9\_IP = 25.2467 - .0086 year\_inducted$$
(3.92) (-2.64) R^2 = .0897

Interestingly, the regressions indicate that over time, the number of walks given up per nine innings pitched have increased while the number of hits given up per nine innings pitched have decreased. The slope coefficients in equations (2) and (3) are practically equal and opposite in sign and explain why WHIP has been relatively constant over time.

Concluding Remarks

Career WHIPs among Hall of Fame pitchers have changed very little since the first year of balloting in 1936, although recent inductees have given up more walks but fewer hits per nine innings pitched. The evidence presented here may not settle the question whether a ticket to Cooperstown is getting any cheaper for pitchers. But, in an era marked by pitch counts and early exits, the career WHIPs of recently inducted pitchers (more of whom are relievers) match up well with pitchers already in the Hall of Fame.

References

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