



ANALYSIS OF CHESS GRAND MASTERS

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Abstract:

In chess, in order to determine the status of chess players and their ranks in classification, World Chess Federation awards players with titles - provided that they fulfill certain criteria. The greatest title that can be earned is the title of Grand Master. In this study, age of becoming Chess Grand Masters has been studied. The factors which have caused the age of becoming a Great Master to fall rapidly in recent years have been researched. It has been found that birth dates close to our day and other social opportunities are influential in the fall of the age of Grand Masters.

Keywords: chess, grand master, title, chi-square analysis

1. Introduction

Chess is a complex intellectual game and is considered a hard mental activity that requires sophisticated problem solving skills and behavioral efficiencies. World Chess Federation (FIDE) describes chess as a game played between two opponents who move their pieces on a square board called a 'chessboard'. The player with the light-colored pieces (White) makes the first move, then the players move alternately, with the player with the dark-colored pieces (Black) making the next move. A player is said to 'have the move' when his opponent's move has been 'made' (FIDE Handbook, 2017). Chess, the game on which the greatest number of books have been has the feature of being the most computer programmed game. Accordingly, chess can be defined as an intelligence game played between two players and deserving computable infinite game description.

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The term 'computable infinite' seems very ambiguous, but how long the game will last cannot be fully calculated. The Belgian mathematician Maurice Kraitchik calculated that a 40-move chess game could be played in $25^x 10^{115}$ different forms (Kraitchik, 1955). This number is more than the total number of atoms on earth.

When we examine the general opinions about chess, we can see that Reti describes chess as a game about which thick volumes have been written and to which the most serious people have devoted all their lives. Reti also states that chess is more prevalent in culturally prestigious countries and that it is a purely mental game that excludes chances. Chess is a new and constantly developing art, and perhaps it is a science (Reti, 2009). Chess is the embodiment of brain gymnastics. As it is played between two people, it is a brainstormed sport with many people, even the person himself or with the computer (Averbach, 2000). As for former World Champion Garry Kasparov, chess is far too complex to be definitively solved with any technology we can conceive of today (Kasparov, 2007). So many descriptions about chess actually summarize the beauty of chess sport.

Chess literature is a term used for a very large field, and in fact it contains all of the chess pieces, as well as the pieces that are of any interest to chess like chess articles, chess compositions, chess history, chess books, chess magazines and chess software. We can group the works on chess written in recent years into four categories:

Studies involving the relation of chess sports to education: De Bruin et al. (2014), Kazemi et al. (2012), Howard (2011), Gerdes and Gränsmark (2010), Bilalic et al. (2009), Bilalic et al. (2007), Draper (1963).

Studies on chess computer programs and their effects, calculations etc: Barnes and Castro (2015), Dailey et al. (2014), Bennett and Lasenby (2014), Bühren et al. (2012), Krawczyk et al. (2011), Bourzutschky et al. (2005), Ewerhart (2002), DeCoste (1997), Peterson (1996), Adelson-Velskiy et al. (1975).

Studies on sports psychology: Gliga and Flesner (2014), Hänggi et al. (2014), Howard (2014), Gobet and Ereku (2014), Charness (2012), Ruiz and Luciano (2012), Moxley and Ericsson (2012), Linhares and Fritas (2010), De Bruin et al. (2007), Grabner vd. (2007).

Studies based on mathematical calculations such as position calculations or number of moves in chess: Chassy and Gobet (2015), Gong et al. (2015), Thanatipanonda (2014), Veccek et al. (2014), Sörqvist vd. (2013), Boros et al. (2012), Regan and Haworth (2011), Erilli et al. (2010).

2. Material and Methods

2.1. Grand Master Title in Chess

In order to determine the status of chess players and their ranks in classification, FIDE awards the players with titles - provided that they fulfill certain criteria. These title names can change according to ladies and general category. These titles are: CM (Candidate Master), FM (FIDE Master), IM (International Master) and GM (Grand Master). The same titles for women are defined as WCM, WFM, WIM and WGM. Male players cannot get the titles of female players, but ladies can get FM, IM and GM titles.

The greatest title that can be earned in a chess game is the title of Grand Master (GM). A player who is a GM, may use this title for life from the date on which it is valid. The title cannot be withdrawn or lowered except in cases of contradiction. (The only exception to this is the Georgian GM Nigalidze, who was found guilty of using a mobile phone in the tournament and whose title was downgraded to IM) The standard uses for the title was clear: a grandmaster was someone who was recognized as a world-class player at some point in their career. As the process advanced, clear criteria needed to be established for future title contenders.

In order to be a grand master, it is necessary for the players to fulfill the conditions that FIDE sets. Except for some major tournaments (such as World Cup, Chess Olympics, World Junior Championships etc.) set by FIDE, a player must score GM norms in at least three different tournaments and having a limit of 2500 ELO score (ELO is the class point system to help to determine the ranking of chess players in the tournaments). In order for GM to qualify for a tournament, the player must perform at least 2601 ELO performance at the end of the tournament, must have played at least 3 GMs and at least one win against a GM. This entire process requires very long and difficult challenges.

FIDE first awarded the Grandmaster title in 1950 to 27 players. As of January 2017 list, there are 265,125 players in the FIDE's registered ELO system. Only 1537 of these use GM title. Even this rate, which is about 57 in ten thousand, shows the value of this title.

2.2. Data analysis

In this study, descriptive statistics of the age of becoming a Grand Master have been made. Chi-square analysis for the binary comparison and regression analysis for the estimation has been used for the Grand Master age.

Particularly, the growth of developing technology and printed chess resources affect the success of young generation in chess positively. In this study, statistical analyzes were carried out on the number of GM, the year of becoming GM and age of

becoming GM. Thus, the effects of mastering chess as the years progressed were researched.

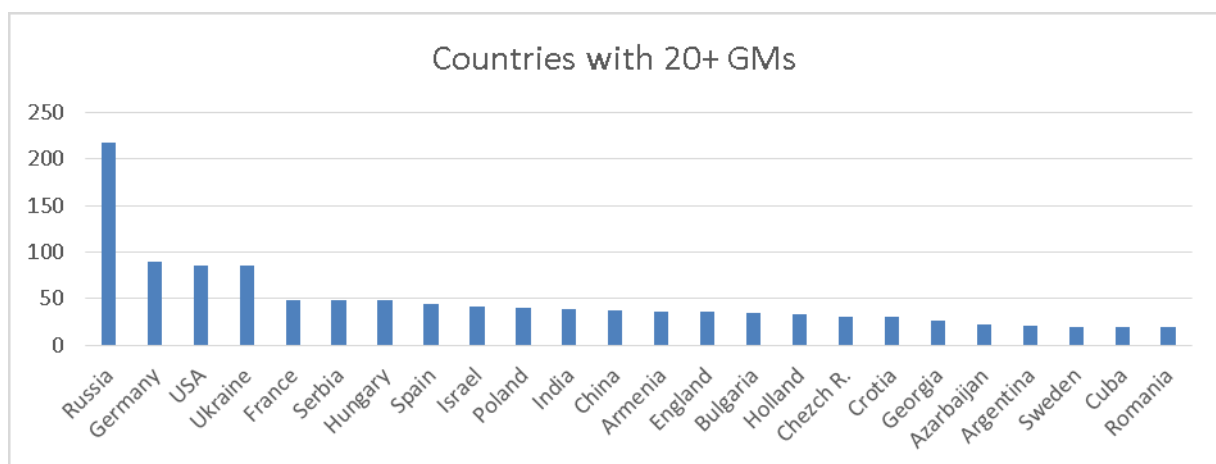
3. Results

The World Chess Federation updates the ELO lists every month. Thanks to these lists which are updated by including all the tournaments all over the world instantly in the system, players can follow their own ranks both in the country they live in and worldwide.

According to the January 2017 list, there are 1537 GMs in the world. Of the 1537 Grand Masters, 33 are women and 1504 are male players. The highest ELO score belongs to Norwegian World Champion Magnus Carlsen, which is 2840. He also owns the highest ELO score ever with 2882. 1537 GMs live in 85 different countries. When we look at the continents; there are 1040 GMs in Europe (67,7%), 298 GMs in Asia (19,4%), 125 GMs in North America (8.1%), 56 GMs in South America (3.6%), 11 GM in Africa (0,7%) and 7 GMs Australia (0,5%).

When we look at the GMs of the countries; the maximum number of GMs, 218 (14.18% of all GMs) are in Russia. The other top countries are; Germany has 89 GMs, U.S.A. has 86 GM sand Ukraine has 85 GMs. Table.1 gives a graph of countries which have 20 or more GMs.

Table 1: Countries with 20 or more GMs

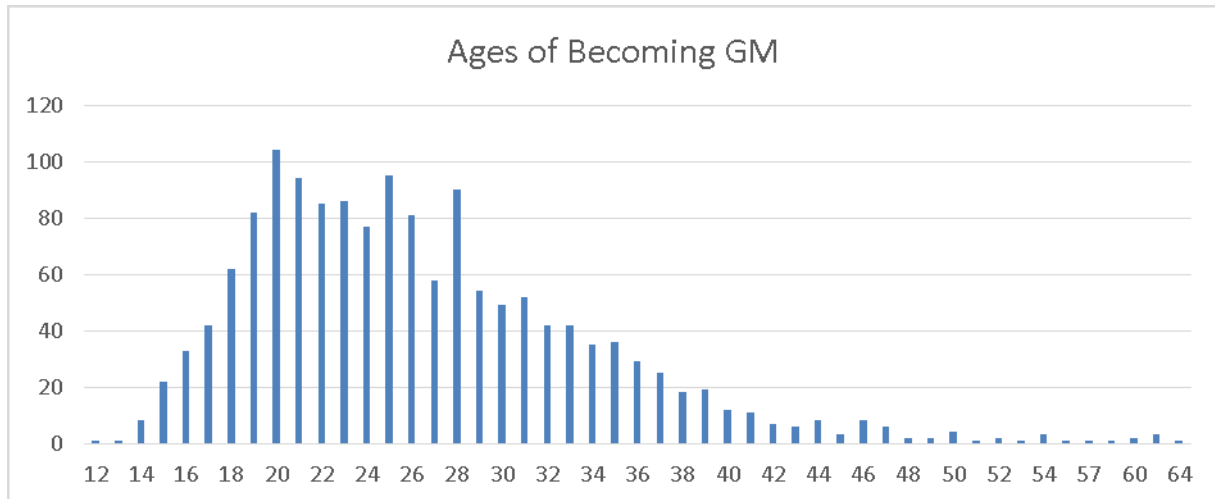


The record of becoming the youngest GM belongs to Ukrainian Sergey Karjakin with 12 years and 7 months in 2002. So far, 34 players have taken GM title at the age of 15 or younger. 5 of these are American, 4 are Ukrainian, Chinese and Indian.

The average age of becoming GM for 1537 GMs is 26.29. The youngest became GM at the age of 12 and the oldest at 64. The maximum frequency for the age of

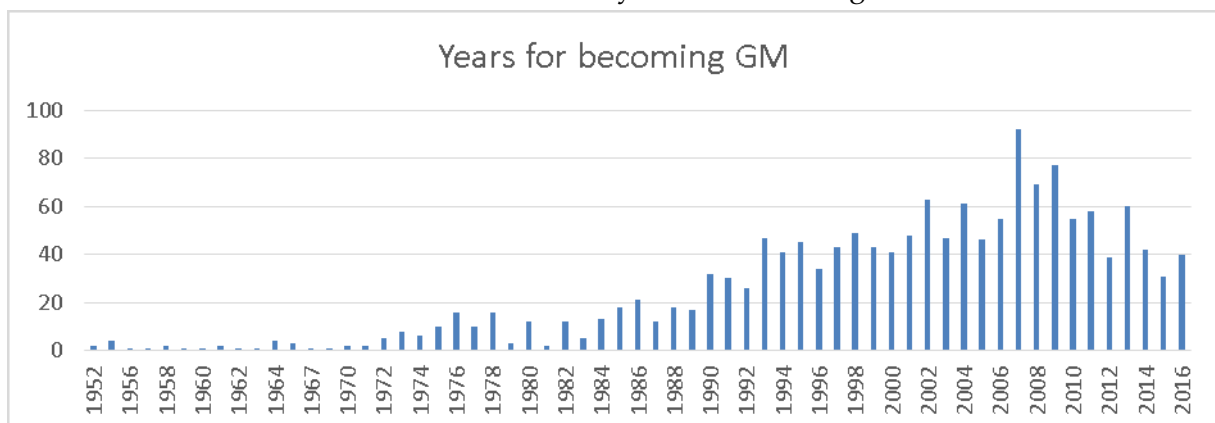
becoming GM is 20 with 105. The age of 25 with the frequency of 96 and the age of 28 with the frequency of 92 are the most repetitive ages. Table.2 gives the distribution graph for the age of becoming GM. When we look at the graph, the range of 18-29 years of age is seen as the maximum range of becoming GM.

Table 2: Distribution Graph for the age of becoming GM



With advancing technology (such as electronic training programs, super-powerful chess computers, online databases etc.), increasing numbers of chess books and magazines, it is faster and easier to advance in chess today than in the 1980s or before. Table.3 gives distribution graph of the players according to years of becoming GM. When we look at Table 3, the increase can be seen easily compared with the years. According to this, in 2007, GM title was obtained by 92 most.

Table 3: Distribution of years for becoming GM



Similarly, the relationship between players' years of becoming GM and birth years is clearly seen in Figure.1. As years of birth progressed (their age got smaller), the years of becoming GMs are approaching each other.

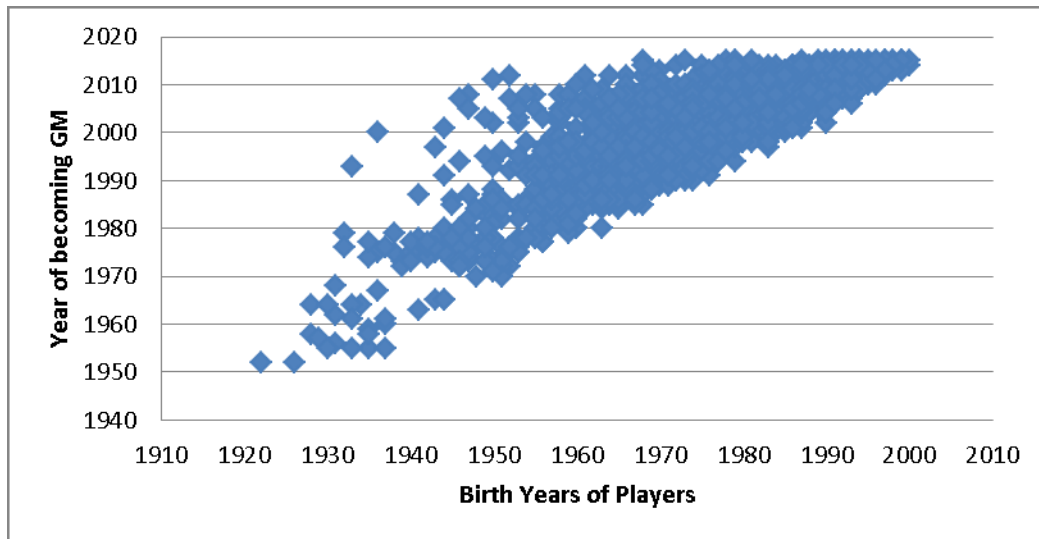


Figure 1: Scatter Plot for GM's Birth Year and year of Becoming GM

Birth ranges of the GMs who became master under age of 20 are given in Table.4 with 10-year periodical terms. It is seen that the maximum group size with the greatest number of players becoming GM under age of 20 is between the years 1980-1990. This period accounts for 43.01% of all players under the age of 20. It is estimated that the number of GMs under the age of 20 which started to increase rapidly after the 1970-80 period will increase further. Similarly, the number of players becoming GM at the age of 15 and under is 33. Three players in this category are born after 2001.

Table 4: Birth ranges of GMs becoming under age of 20

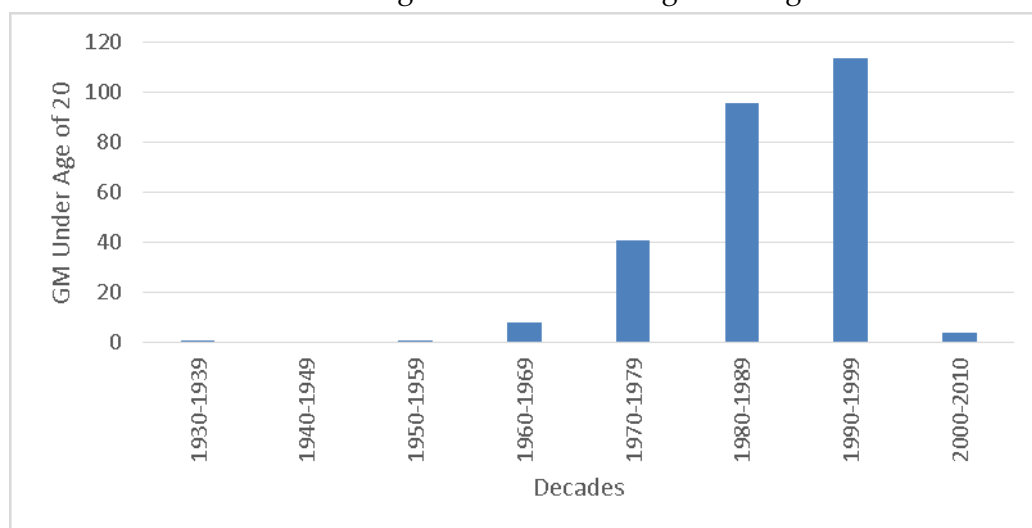


Figure 2 gives a graphical representation of the relationship between the age of becoming GM and birth years of players. As it is easily understood, as the years go by, the age of becoming GM is also decreasing. This distribution is statistically significant at level 0,05 ($p = 0,000$).

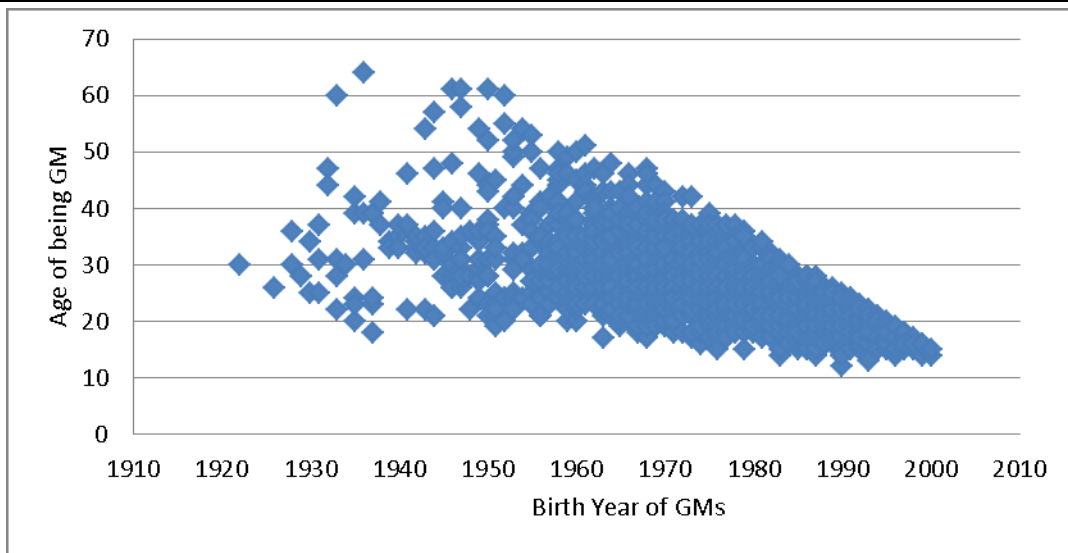


Figure 2: Scatter Plot for the age of becoming GM and birth year of GM

The number of players and the average age of the players according to 5-year periods are given in Table.5. Statistically significant difference according to years is found with Chi-Square test ($p = 0,000$). The average age of the players born in 2016 is 21,675.

Table 5: Number of GMs with 5 year annual periods

Year of Becoming GM	N	Average Age of GM
2013-2017	176	24,06
2008-2012	298	25,87
2003-2007	299	26,34
1998-2002	244	26,21
1993-1997	206	27,44
1988-1992	123	26,53
1983-1987	68	27
1978-1982	45	27,93
1973-1977	49	29,73
1972 and Before	29	24,86

The same analysis was made according to the years of birth of the players. In the data in Table 6, the number of GMs and the average age of the players are given according to the players' year of birth. Statistically, there was no significant difference between the years 1920-29 and 1930-39; 1920-29 and 1940-49; 1930-39 and 1940-49. Statistically significant differences have been found between the other years ($p = 0,000$).

Table 6: Numbers of GMs via year of birth

Year of Birth	N	Average age of becoming GM
2000-2009	4	15
1990-1999	205	19,17
1980-1989	417	22,51
1970-1979	363	26,74
1960-1969	310	30,24
1950-1959	145	32,81
1940-1949	64	34,41
1930-1939	26	34,5
1920-1929	3	29,33

When we analyze the relationship between the birth year of GMs and average per year for age of becoming GM, the correlation coefficient is found as -0,986 and it is statistically significant at level 0.01 ($p=0.000$). The high -0.986 correlation coefficient tells us that, when birth year increases, average age of becoming GM decreases. This relationship can be seen simply in Figure 3.

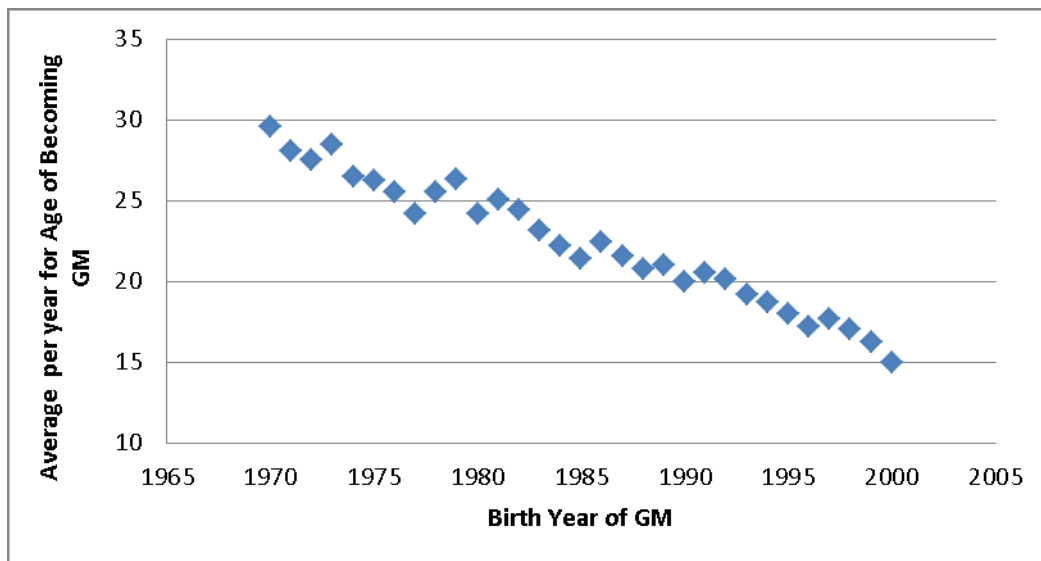


Figure 3: Scatter Plot for age of becoming GM and birth year of GM

Similar to this, the correlation coefficient between the age of becoming GM and birth year is found as -0.617 and it is statistically significant at level 0.01 ($p=0.000$). If we want to predict next generations' age of becoming GM, regression analysis result is given below:

$$GM\ Age = 676.87 - 0.330GM\ Birth\ Year$$

For example, if we want to know the average age for becoming GM for the players who were born in 2005, the estimate will be $676.87 - 0.330 \times 2005 = 15.22$. For 2010 it is 13.57 and for 2015 it is 11.92. It is a very low average which is hard to be realized but this may be possible if we look at recent developments.

Finally, the numbers of GMs with the age of 20 and younger and the number of GMs with the age of 15 and younger are given in Table.7 according to the birth years of players with 10-year periods.

Table 7: Numbers of decades for becoming GM at the age of 15 and 20 and younger

Decade for becoming GM at the age of 20 and younger	N	Decade for becoming GM at the age of 15 and younger	N
1930-1939	2	1970-1979	2
1940-1949	0	1980-1989	8
1950-1959	4	1990-1999	20
1960-1969	18	2000-2009	3
1970-1979	56		
1980-1989	147		
1990-1999	140		
2000-2009	4		

As for the results in Table.7, we can see increasing number both for becoming GM at the age of 15 years and younger and at the age of 20 years and younger with 10-year periods. There is a statistically significant relationship between years of becoming GMs and number of GMs ($p = 0,000$).

4. Discussion and Conclusion

As in every sports branch, chess needs very long effort to be at the top level. Unlike other sports, chess is a sport in which thinking is a front-line, age awareness is not important and personal development can be in almost every period.

The World Chess Federation gives titles to honor the players and to better identify their place in the classification. The most important title to obtain in chess is the title of Grand Master. According to the ELO list which is updated every month by FIDE, there are 265,125 players and only 1527 of them own Grand Master title.

Thanks to factors such as the widespread popularity of chess, the number of tournaments that have grown in almost every country, increased technological support, and printed materials that can be found much easier than in the past, getting a Grand Master title became even easier than in the past. In this study, the statistical evaluation of the players with the title of Grand Master was investigated out in general. It has been

seen that the age of being a Grand Master has fallen in the last 20 years. This situation has been analyzed statistically in this article. According to the results obtained, there is a statistical relationship between the birth years of the players and the age of becoming the Grand Master ($p = 0,000$). After the 80's, the number of younger GM titles has increased. Similarly, there is a statistically significant relationship between the birth years of the Grand Masters and the years of becoming Grand Master ($p = 0,000$). It can be said that the new generation players are more successful than the past ones.

In chess, it is a truth that next generations will be more successful. In this study, a statistical analysis of the Grand Masters was carried out. It can be said that the social conveniences and technological support that developed during the period of time are important influences in the fall of the grand master age in chess. We can say that the success age for becoming Grand Master will be around 11 in the next 10 years.

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